Special and Other Sessions

Tuesday, Wednesday, Thursday June 10, 11, 12, 2008

Special Sessions Coordinator: ***Jane Krolewski,*** Army Materiel Systems Analysis Activity
Special Sessions Assistant Coordinator: ***Robert Koury,*** Lockheed Martin Maritime Systems & Sensors
Special Sessions Sponsor Coordinator: ***Bruce Wyman,*** Northrop Grumman Information Technology

Special Session I – Tuesday, 10 June 2008

Analytical Preparations for the Next QDR

Each sponsor will identify their key QDR questions, analysis preparations, and analytical challenges. Special emphasis will be placed on (1) Irregular Warfare analysis and the proper role of wargaming (2) their framework for supporting modernization and recapitalization decisions, and (3) their treatment of risk and uncertainty. The session will also include a panel discussion with brief presentations by each of the Sponsor Organizations and the Joint Staff followed by Q&A.

Panel Members:

Mr. E. B. Vandiver III, FS, Director, Center for Army Analysis
Mr. Arthur H. Barber III, Office Chief of Naval Operations (N81B)
Dr. Jacqueline R. Henningsen, FS, Director, Studies and Analyses, Assessments and Lessons Learned (HQ USAF/A9)
Dr. George Akst, Marine Corps Combat Development Command
Ms. Lisa Disbrow, Joint Staff (J8)
Mr. Eric J. Coulter, Director, Program Analysis & Evaluation
Mr. Eric Fagerholm, Director, Quadrennial Home Land Security Review, Department of Homeland Security

The Deployed Analyst

Coordinator: ***COL Thomas Cioppa***, TRADOC Analysis Center

The US military analytic community has provided deployed analysts in-theater for analytical support and reach-back capability to support the warfighter. COL Thomas Cioppa has coordinated a panel of deployed analysts from the Air Force, Army, Coast Guard, Navy, Marine Corps, and a civilian to pass on their experiences and discuss their analytical support and challenges. The deployed analyst representatives are:

Army: **COL Thomas Cioppa,** TRADOC Analysis Center
Air Force: **Lt Col Douglas M. Harlow**, Air Force Studies & Analyses, Assessments and Lessons Learned (AF/A9)
Coast Guard: **LCDR John W. Pruitt, III,** USCG Office of Strategic Analysis (CG-511)
Marine Corps: **Captain Earl Richardson**, Operations Analysis Division of the Marine Corps Combat Development Command
Navy: **CDR Douglas Burton**, Naval Postgraduate School
Civilian: **Robert Holcomb**, Institute for Defense Analyses

Strategist's Corner: Fighting Identity, Why We Are Losing Our Wars

Coordinator: ***Dr. Ted Bennett***, Naval Oceanographic Office

The Strategist's Corner is a forum for discussing the "forest" of national security issues rather than the individual "trees." The 76th MORS will feature ***Dr. Michael Vlahos,*** with a discussion from his forthcoming book, **Fighting Identity, Why We Are Losing Our Wars**:

Why are terrorists and insurgents we fight so formidable? Their strength — and our vulnerability — is in identity. Clausewitz knew that *geist* (spirit) was always stronger than the material: *identity is power in war*.

But how can "non-state actors" face up to nation states? The answer is in globalization. This is the West's 3rd globalization. Two centuries of intense mixing has torn down old ways of life and created a growing demand for new belonging.

There is also a decline in US universalism. America's vision as history's anointed prophet and manager is now competing head-to-head with renewed universal visions. Like Late Antiquity and the High Middle Ages our globalization begins to subside. We may be in the later days of American modernity.

We can see this worldwide, as emerging local communities within states and meta-movements find their voice — through conflict and war. Identities struggling for realization are always the most powerful. Add the diffusion of new technology and new practice, and even the poorest and seemingly most primitive group can now make war against those on high.

They are successful because of a symbiotic "fit" between old states and new identities. Increasingly, old societies no longer find identity-celebration in war — while non-state identities embrace the struggle for realization. Hence non-state wars with America become a mythic narrative for them. Our engagement actually helps them realize identity — and we become the midwife.

This presentation offers another path to deal with non-state challenges, one that does not further weaken us.

The Heritage Session: Heritage and History of the Coast Guard

Coordinator: ***Mr. Mike Garrambone****,* General Dynamics

This year the MORS Heritage Special Session will be held at the United States Coast Guard Academy in New London, Connecticut. The venue is all about the history and heritage of the Coast Guard and the use of Operations Research in supporting missions. The stage is set to hear about the early Coast Guard from the earliest of times in US History to the current missions of the Coast Guard today as a distinctive agency of the Department of Homeland Defense. Our session with begin with **Captain Robert C. Ayers**, of the United States Coast Guard Academy, Humanities Department who with discuss the History and Heritage of the Coast Guard. He will be followed by several speakers who will discuss Operations Research in the Coast Guard. After this, a panel will provide us with information about their own tours of duty as Coast Guard analysts, and time permitting, will answer specific questions about the applications of Operations Research on their "watch." Come to this MORS Special Session to hear about the Coast Guard's use of Operations Research and its practical applications by veterans who compose our senior Coast Guard panel.

The Navy and the Coast Guard: Integrating Maritime Security

Coordinator: ***CDR Aasgeir Gangsaas***, USN, Assessment Division, Office of the Chief of Naval Operations (N81)

Speakers from the Navy, Coast Guard and the Naval Postgraduate School will discuss GWOT maritime operations, Meteorological and Oceanographic (METOC) factors, Maritime Domain Awareness and other factors. Speakers will include Mr. Charles Martinek, NAVOCEANO Technical Director.

Prize Paper Session – Rist and Barchi Prize Presentations

Coordinator: ***Ms. Annie Patenaude,*** OSD (Personnel and Readiness)

MORS offers two annual prizes for the best papers presented in the military operations research community. The Barchi Prize is awarded to the best paper from a MORS Symposium, nominated from working groups, composite groups and special sessions. The Rist Prize is awarded in response to a Call for Entries. The Rist Prize will be awarded to the best-implemented study submitted—including studies that influence major decisions. Final judging will be held in conjunction with the 76th MORS Symposium and will be based on a formal presentation of the results of the implemented study. There are two cash prizes that may be awarded: $3,000 for first place (i.e. Rist Prize winner) and $1,000 for honorable mention. The competition is top-notch, making this a "must-attend" session. The Rist and Barchi Prize Winners will present their winning papers during this session.

75th MORSS Barchi Prize Recipient:

A Decision Support Tool for Optimizing Mine Roller Allocation to Counter the Improvised Explosive Device Threat in the Al Anbar Province of Iraq, Capt Joseph A. Mlakar, USMC, Marine Corps Operations Analysis Division

2008 Rist Prize Finalist – One of the following finalist will present their winning paper during this session.

- ***Maritime Domain Awareness Scenario Based Analysis,*** Steven C. Pearson
- ***Optimal Distribution of Resources for Non-Combatant Evacuation,*** MAJ Steven J. Sparling, Center for Army Analysis and Robert F. Dell, Ph.D., Naval Postgraduate School
- ***Army Reserve Stationing Study,*** LTC Robert D. Bradford and Mr. Tucker Hughes, Center for Army Analysis
- ***The Force Sufficiency Analysis Timeline Tool,*** John Duke, Erik Adams, Roger Burley, Preston Dunlap, and Lt Col Tim Smetek, OSD PA&E Simulation and Analysis Center
- ***Statistical Analyses of the Percentages Remunerated in Compensation to Disabled US Army Soldiers,*** John (Jack) Zeto, Center for Army Analysis

Special Session II – Wednesday, 11 June 2008

MORS Books

Coordinator: ***Mr. Mike Garrambone*****,** General Dynamics

We have had great success in bringing the MORS Heritage and Monographs Books to the attention of MORS Symposium attendees. This came about by the presentation made at the 75th Symposium last year by discussing four books during a Special Session devoted to MORS Books. This year we will discuss the following books in a similar manner with presentations by those terrific MORS volunteers cited.

- ***Methods for Conducting Military Operational Analysis*** edited by Dr. Andrew G. Loerch and Dr. Larry B. Rainey. Presented by Dr. Andrew G. Loerch, FS, of George Mason University.

- ***Operations Research in the RAF (Royal Air Force)*** by the Controller of Her Majesty's Stationary Office. Presented by Patrick J. McKenna, of USSTRATCOM/J53.

- ***Naval Consulting Board of the United States*** by Lloyd N. Scott. Presented by Michael W. Garrambone, of General Dynamics.

- ***Warfare Modeling*** edited by Jerome Bracken, Moshe Kress, and Richard E. Rosenthal. Presented by Professor Wayne P. Hughes, Jr., (Capt, USN Ret.), FS, of Naval Postgraduate School.

US Coast Guard Special Session: Analytical Challenges for Optimizing Capacity and Capability Issues in the Era of Expanding Missions

Coordinators: ***Mr. Robert Koury***, Lockheed Martin Maritime Systems and Sensors, ***Mr. Bert Macesker,*** Chief, Analysis, Modeling and Simulation Branch, U.S. Coastguard R & D Center,

The U.S. Coast Guard (CG) Commandant noted in his most recent State of the CG address that there is a limit to what any organization can accomplish when the overall end strength has not changed materially in 50 years. Nevertheless, the CG continuously assesses its environment to discern changes and demand signals for its missions. The quantity and types of capabilities (i.e., assets, people, systems) employed in the CG have a significant influence on mission outcomes and system performance. However, fiscal responsibility precludes the CG from adopting a pure strength-through-numbers-approach and other means of positively influencing mission outcomes must be identified and vigorously applied. Adopting an information driven approach along with a focus on identifying the effects to be achieved is a must for the future. Thus, the CG will need to increase its organic analytic expertise at all levels; enhance its enterprise-wide toolbox with updates/new campaign-level, mission and tactical-level modeling tools; and now more than ever, lean on industry and OGAs for their best practices and expertise in helping this service be as effective and efficient as it can be.

Analytical tools are needed across all levels from Sector, District, and Area, to HQ Commands in order to manage our base (how we deploy/optimize current resources). Robust analytical decision support tools are needed at the Tactical Level to address the day-to-day planning/resource allocation decisions for rapid mission execution. At the Operational Level, analytical capabilities are needed to make adjustments to annual force apportionment decisions in alignment with meeting annual performance measures and to identify the capability/capacity performance gaps that need to be addressed. At the Strategic Level, analytical tools help to assess the current capacity and capability inventory against future mission profiles to determine necessary acquisitions.

Constrained resources and an expanding mission profile drive the need to embed a culture of analysis with stronger linkages throughout the organization. In this session, CG panel members will discuss a few analytical and decision support challenges from the perspective of an ***Analytical Systems Approach across the Tactical, Operational and Strategic Levels.***

US Department of Homeland Security (DHS) Special Session: DoD OR Techniques and the DHS

Coordinator: ***Dr. Jerry Diaz***, Homeland Security Institute

DHS will host a panel discussion during this Special Session to focus on the analytic issues in the grey area between Homeland Security and Homeland Defense. Of particular interest will be those unresolved DHS areas to which we can apply military operations research techniques. In analyzing DHS issues, a particular challenge is the relationship between the Federal Government and the States, cities, local municipalities, and tribal entities. Issues to be highlighted are:

- DHS Requirements Generation Process
- DHS Resource Allocation Process
- Handling Federal, State, & Local Capability in DoD Analysis
- Homeland Security Risk Modeling to Inform the Budget Process

The panel will be composed of five to six speakers who will speak for 5 to 10 minutes and then answer questions from the other panel members. At the end of the discussion, the panel will take questions from the audience.

Dr. Jerry Diaz, from the Homeland Security Institute (HSI), will chair the panel. Invited speakers include Mr John Whitely (DHS/PA&E), Mr Al Sweetser (DoD/PA&E), Mr Mitch Crosswait (DHS/PLCY), Mr George Thompson (HSI), and a senior NORTHCOM representative.

US Army Special Session: Deployed Analyst Update

Coordinator: ***LTC(P) Kirk C. Benson***, Center for Army Analysis (CAA)

Speakers:

LTC(P) Kirk C. Benson, CAA
COL Jeffrey Appleget, TRADOC Analysis Center (TRAC)
Mr. Joseph Parham, US Army Materiel Systems Analysis Activity (AMSAA)

The U.S. Army Operations Research / Systems Analysis (ORSA) community continues to evolve its support to Operational Headquarters that include Multi-National Force – Iraq (MNF-I), Multi-National Corps – Iraq (MNC-I), Multi-National Security Transition Command – Iraq (MNSTC-I), Combined Security Transition Command – Afghanistan (CSTC-A) as well as other commands. A broad survey of recent analytic efforts and the overarching Reachback Central architecture will be presented during this session. This effort will also highlight the contributions of Generating Force organizations to Operational Army analytic efforts across the Doctrine, Organizations, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) spectrum. These organizations include the Center for Army Analysis, Training and Doctrine Command (TRADOC) Analysis Center (TRAC), and Army Materiel System Analysis Activity (AMSAA).

US Air Force Special Session: Recapitalizing the Air Force

Coordinator: ***Mr. Balf B. Calloway***, Air Force Studies and Analyses, Assessments and Lessons Learned (HQ USAF/A9)

Subject matter experts from around the Air Force Community will talk about several of the hottest force structure issues facing senior leadership.

US Navy Special Session

Coordinator**:** ***Mr. Herbert S. Cupo*****,** Office Chief of Naval Operations (N81)

Navy Corporate Analytic Agenda

Mr. Arthur H. Barber III, Deputy Director, Assessment Division (N81)

Within the staff of the Chief of Naval Operations, the Assessment Division (N81) acts as the single headquarters' analytic organization for execution of Navy's Corporate Analytic Agenda. N81 conducts analysis to assist in development of investment plans and programs to deliver combat-ready naval forces in support of Navy and Joint mission requirements. This presentation will describe the role of N81 in executing tasking from the Chief of Naval Operations, as well as Joint Staff and OSD direction for implementation of the DoD Analytic Agenda.

Assessing Navy ISR Requirements

CDR Eric Law, USN

This study analyzes Navy ISR requirements to determine what Navy must have to successfully execute joint force maritime component commander warfighting missions. This study builds upon traditional campaign and mission level analysis by assessing requirements using warfighter-derived information requirements. The collected information requirements were decomposed into quantifiable metrics to assess the capability and capacity of joint, national and Navy sensor systems to satisfy the information requirements. Information requirement satisfaction was tied into campaigning metrics to determine ISR impacts in the warfight. Analysis was conducted across all three current MCOs and four Fleet-identified GWOT scenarios. Results clearly show that, while Navy is interdependent with joint and national for ISR, Navy tactical sensor systems are essential to successfully executing maritime warfighting missions.

A Red Anti-ship Missile Kill Chain

LCDR John E Ethridge, USN

This presentation details the analysis of anti-ship missile threats to naval forces and the naval capability to counter these threats. It addresses the entire kill chain, from initial sensing to data fusion and command decision-making to weapon impact. The goal of the analysis was to examine each part of the kill chain and identify potential Red weaknesses that could be exploited by US forces. The analysis used a Monte Carlo (Naval Simulation System) model to develop insights for inclusion in joint campaign analysis. Finally, the presentation will present insights about key systems and potential measures to counter anti-ship missiles gained from the analysis.

Navy Operations Analysis Community Management

LCDR Eric L Conzen, USN

Commands, the Joint Staff and the OSD Staff. In addition to its responsibilities as Navy's MORS Sponsor, N81 is responsible for developing and maintaining the cadre of over 575 skilled officers needed to support our analytical needs. This presentation will provide an overview of Navy's OA community demographics; the requirements and education processes; and "return on investment" given that the inventory has historically been inadequate to fill demand – a problem shared across all the services.

Special Session III – Thursday, 12 June 2008

OSD/Joint Staff Special Session: Irregular Warfare (IW) Activities in OSD and the Joint Staff

Coordinators: **Mr. James Bexfield**, OSD/PA&E, **Mr. James Stevens,** OSD/PA&E, **CAPT(SEL) Brett M. Pierson**, Joint Staff J-8

This OSD/Joint Staff-led session will provide an overview of ongoing efforts to organize and resource the Department's Irregular Warfare (IW) portfolio and to conduct IW studies and analyses. The session will consist of two parts. Part 1 will provide an overview of OSD and JS initiatives, including: (1) the charter and actions of the Counter Terrorism Coordinating Council (CTCC), co-chaired by the Principal Director, OSD(Policy) and the Director, Joint Staff; (2) the Human Terrain and the Human, Social, and Cultural Behavior (HSCB) data development and research activities; and (3) a description of some DoD-level IW studies (e.g., the Irregular Warfare Study mandated by the Guidance for the Development of the Force, a study based on a scenario set in Africa, and a wargame of another IW scenario). Part 2 will be a description of a recent J8 study that applied system dynamics theory to the new Army field manual (FM 3-24) on counterinsurgency

76th MORSS Junior/Senior Analyst

Coordinator: ***Mr. Dennis Baer***, Whitney, Bradley, & Brown

The Junior/Senior Analyst program will take place for the nineteenth consecutive year at the 76th MORS Symposium. Historically, this event, conducted during Special Session periods of the annual symposium, has been very successful and has drawn both junior and mid-level audiences. The session will start off in one room, where the new MORS mentorship program will be introduced. The participants interest will be surveyed, then based on your response, will break off in two to three smaller groups. The individual groups will be headed by respected senior analyst from the military, government, and contractor communities. It is a great opportunity to ask questions in an environment unique from the working groups and other special sessions.

Wargaming Community of Practice

Coordinator: ***Mr. Ted Smyth***, The Johns Hopkins University Applied Physics Laboratory

MORS Special Meeting outbrief on Wargaming Community of Practice

US Coast Guard Follow-On Special Session: Analytical Challenges for Optimizing Capacity and Capability Issues in the Era of Expanding Missions

Coordinators: ***Mr. Robert Koury***, Naval Oceanographic Office, ***Mr. Bert Macesker,*** Chief, Analysis, Modeling and Simulation Branch, U.S. Coastguard R & D Center

This is a follow-on session to Wednesday's Coast Guard Special Session.

Focus Sessions – Tuesday and Wednesday, 10 - 11 June 2008

Preliminary Agenda for Focus Session FS-IA
Information Assurance
Chair: Donna Gregg, Donna.Gregg@jhuapl.edu

Hybrid Simulation And Virtualization Research For Information Assurance Analysis

Mr. Michael J McDonald, Mr. Thomas D Tarman, Mr. Peter E Sholander
Approved abstract unavailable.

IP/IA Considerations for Technical Performance Criteria for Nuclear Command and Control

Mr. Michael J Silberglitt	**Mrs. Laura A Nolan**
The Johns Hopkins University Applied Physics Laboratory (JHU	The Johns Hopkins University Applied Physics Laboratory (JHU
11100 Johns Hopkins Rd	11100 Johns Hopkins Rd
Laurel,MD 20723	Laurel,MS 20723
240-228-8261 FAX: 240-228-6345	240-228-5000
michael.silberglitt@jhuapl.edu	laura.nolan@jhuapl.edu

In light of the push for USSTRATCOM missions to include packet-switched, IP- based networking, The Johns Hopkins University Applied Physics Laboratory (JHU/APL) was tasked by the OASD/NII to determine any specific performance metrics necessary to ensure Command and Control (C2) functions are still successful. In more specific terms, the task was to determine any necessary changes to existing performance criteria to account for IP and IA concerns. The study identifies IP/IA performance metrics not sufficiently addressed in certain requirements documents. In addition a methodology is developed using quantitative and qualitative metrics to evaluate the Cyber Incident Level (CIL), a term introduced to represent the level of Computer Network Attack/Computer Network Exploitation (CNA/CNE) on a blue force computer network. A methodology is also developed to use the CIL concept in comparing system degradation resulting from CNA/CNE to degradation caused by other types of attack. Although the study was limited to specific portions of the C2 system, performance metrics and the associated methodologies discussed in the analysis could be applied to broader national missions.

Simplifying and Standardizing Cyber Risk Management

Mr. Donald L Buckshaw, Dr. Daniel T Maxwell
Approved abstract unavailable.

The Network Risk Assessment Tool (NRAT), A Case Study

Mr. Bud Whiteman
Approve abstract unavailable.

Information Assurance Test and Evaluation Process: An ATEC Perspective

Mr. Dwayne T Hill, USA	**Ms. Melanie Miller, USA**
US Army Test and Evaluation Command (ATEC)	US Army Test and Evaluation Command (ATEC)
4501 Ford Avenue	4501 Ford Avenue
Alexandria,VA 22302	Alexandria,VA 22302
703-681-2749	410-278-1489
DSN: 761	DSN: 738
FAX: 7036816914	Melanie.L.Miller@us.army.mil
Dwayne.Thomas.Hill@us.army.mil	

Joint Vision 2020 will be achieved with the introduction of a wide range of new technologies that will support network centric warfare, from the Joint Tactical Radio System to Unmanned Ground Vehicles. The Net Ready Key Performance Parameter (NR-KPP) has been established in part to ensure that these new systems will seamlessly integrate into a net centric environment. Information Assurance as a component of the NR-KPP must be assessed on a recurring basis to provide the warfighter with an understanding of their capabilities and limitations to protect and restore their data and information from corruption, as well as their ability to detect and appropriately react to corruptions in data. The challenge to the Test and Evaluation (T&E) community is to first understand the Warfighter's Information Assurance requirements and then develop strategies to evaluate it. This presentation will provide an overview of the process used to develop an integrated system-of-systems test and evaluation strategy, and ATEC's IA assessment methodology.

Interactive Systems Simulation and Analysis for IA with the Umbra Environment

Mr. Michael J Skroch, Mr. Fred J Oppel III
Approved abstract unavailable.

Preliminary Agenda for Focus Session FS-DHS
Homeland Security
Chair: Dr. Arch Turner, DHS S&T Directorate, arch.turner@dhs.gov

Risk Assessment and Management Challenges in DHS Resource Allocation
Mr. Mark Hanson, Homeland Security Institute

The Department of Homeland Security conducts a wide range of analyses for the purpose of informing DHS leadership and decision makers. These analyses are used for a variety of purposes and at several levels. Risk assessment/management analyses are no exception, but their designs present special challenges, particularly in light of the high degree of inherent uncertainty involved. This presentation offers two examples of broad-level comparative risk analysis designed to inform resource allocation decisions for different decision makers. Similarities in design are explored as well as differences for each case that stem from unique purposes relevant to the supported decision maker. Common analytical challenges from both cases are summarized for community consideration when conducting similar risk-related analyses.

Consequence Management Response Study
Mrs. Lisa Seymour, OSD Program Analysis and Evaluation

The Department of Defense is in the process of configuring and sourcing Consequence Management (CM) response forces. These forces are intended to augment overwhelmed local and state response mechanisms in a catastrophic event. The objective of our study will be to determine the demand (based on effects of the National Planning Scenarios) and the supply (capabilities) of the consequence management response units from DoD and other early responders. Our analysis will evaluate capability gaps or overmatch, where current and projected capabilities fail to meet or exceed projected national planning scenario demands.

Determining the Appropriate Size for FEMA's Force Structure
Mr. David Ashley, FEMA Program Analysis and Evaluation

A critical aspect of ensuring FEMA is an efficient and effective organization ready to deliver critical services to the American Public is the development of a method to help determine the correct force structure size for FEMA. This method will be based on disaster level definitions that combine specific disaster-event impact variables with relative probabilities of occurrence. This session will explore key components of FEMA's approach in creating a force structure sizing framework that dovetails existing qualitative methods with a variety of quantitative measurements. This approach will create a comprehensive portrait of disaster levels and needed response resources. A robust force structure approach will enable FEMA to correctly position itself as a forward leaning organization with the right force size to meet its mission.

Driving Improvement at TSA: Our "Balanced Scorecard" for Operations
Mr. Robert Scanlon, TSA Office of Operational Process and Performance Metrics

The Transportation Security Administration (TSA) is among the youngest agencies in DHS. Since its creation by Congress on November 19, 2001 in the aftermath of 9/11, it has undergone tremendous growth and change. This presentation will outline the development and maturation of TSA's performance management system and the introduction and impact of the new Management Objectives Report (MOR), a "balanced scorecard" for Operations, which drove over $90 million in benefits in its first year. The presentation will discuss TSA's approach to performance management including the creation of the new Office of Operational Performance and the application of the MOR from a management system perspective along with key elements involved in the design, operation, and management of performance metrics.

TSA Staffing Allocation Model (SAM): A Tool for Strategic Resource Allocation
Mr. Michael Coffman, TSA Office of Workforce Utilization

The Transportation Security Administration utilizes various data sources and software applications to effectively determine the staffing requirements for passenger and baggage screening at over 400 federalized airports. The Program Manager for the SAM process will provide a brief overview of the SAM tools and processes. This currently includes data for all US Domestic inbound and outbound flights as well as each airport's unique equipment configuration. This information is input into a TSA designed discrete event simulation model to determine the staffing requirements for a picture week at each airport. These results are then input into a COTS (Commercial Off the Shelf) application to determine an optimal work schedule and the associated staffing requirements (Full Time Equivalents) to meet the work requirement. One of the challenges with this process is the accurate depiction of flight originating passenger percentages as well as flight load factors based on day of week variability.

Composite Groups
Tuesday, Wednesday, Thursday, 10 - 12 June 2008

Preliminary Agenda for Composite Group A - Strategic and Defense
Chair: Ms. Rachel Echternach, echternr@stratcom.mil
Co-Chair: Ms. Karen Phipps, phippsk@stratcom.mil

MIT/Lincoln Labs Kill Web
Maj. David Pugh, USAF
Approved abstract unavailable.

Global Sensor Management Decision Support Tool
Maj. David M Pugh, USAF, Capt. Ryan Kappedal, USAF
Approved abstract unavailable.

Preliminary Agenda for Composite Group B - C4ISR and Net-Centric Operations
Chair: Mr. Don Timian, donald.timian@atec.army.mil
Co-Chair: Mike Leite, michael.leite.ctr@osd.mil
Co-Chair: Ken Raab, ken.raab@us.army.mil
Co-Chair: Kyle Rogers, kyle.rogers@us.army.mil

Net Enabled Command and Control (NECC)

Ms. Laura Knight, OSD NECC, Defense Information Systems Agency 5275 Leesburg Pike Falls Church,VA 22041 (703) 882 2268 laura.knight@disa.mil	**CDR Paul Fink, USN** Defense Information Systems Agency 5275 Leesburg Pike Falls Church,VA 22041 703-882-0329 FAX: 703-882-2829 paul.fink@disa.mil

Why should DoD invest in the Net Enabled Command Capability (NECC) now vice continuing to operate in a "business as usual" manner with the Global Command and Control System (GCCS) Family of Systems (FoS)? The answer lies within the operational benefits resulting from NECC and the functional benefits which result in a new business process for acquiring Command and Control (C2) capabilities for the DoD. NECC's single, Joint C2 architecture provides the Warfighter true horizontal and vertical integration across commands as well as business model improvements which lead to more effective employment of C2 capability. Functional improvements, including the Joint Combat Capability Developer (JCCD), Federated Development and Certification Environment (FDCE), and the implementation of a Service Oriented Architecture (SOA), provide for more rapid fielding than current processes and a more responsive, flexible, and adaptable system to support changing Warfighter needs. These benefits provide for business process engineering resulting in a new business model for C2 development and management and speeding delivery and fielding. By using new net-centric technology, the DoD shares capabilities world-wide, reducing costs through centralized support of C2 distributed in the field. The resulting standardized Joint C2 baseline of capabilities is necessary to achieve the Department's goals with C2 Capability Portfolio Management.

DCGS-A: Mission Evaluation Focus Areas; Analytical Framework for the Sensor Feeds, Intelligence Fusion, Networks (Interoperability), Battle Command (Cognitive/Situational Awareness)

Mr. Teddie Outland, USA U.S. Army Evaluation Center (AEC) 4501 Ford Avenue Alexandria,VA 22302 703-681-0872 DSN: 761-0872 FAX: 703-681-3739 teddie.l.outland@atec.army.mil	**Mr. John W Diem, USA** U.S. Army Operational Test Command 91012 Station Ave. Fort Hood,TX 76544 254-288-9363 DSN: 738-9363 FAX: 254-288-1937 john.diem@us.army.mil

This paper will briefly describe the Army's Distributed Common Ground System – Army (DCGS-A) overarching evaluation strategy and its associated Mission Evaluation Focus Areas: 1) analytical framework for the sensor feeds, 2) fusion, 3) networks, and 4) Battle Command (BC). From Battalion to Echelons Above Corps (EAC), DCGS-A will provide to the Warfighter a net-centric enterprise of ISR (Intelligence, Surveillance, and Reconnaissance), weather, geospatial, and space services. It will provide Commanders with the ability to access information and task organic sensors, as well as synchronize non-organic sensors with their organic assets. These services will be shared by Joint Commanders using the DCGS Integrated Backbone (DIB). All of the Services and the Joint community will use DCGS. The challenge for Operational Test Agencies (OTA), like ATEC (Army Test and Evaluation Command), is creating that realistic, Joint Net-Centric environment during operational and developmental test events. This is why the Operational Test Command (OTC) – in support of the Summer 2008 DCGS-A Limited User Test (LUT) – is integrating a Live, Virtual, and Constructive (LVC) Modeling and Simulation (M&S) Federation which leverages M&S found in the both Army and Joint training communities.

Preliminary Agenda for Composite Group C - Joint Warfare
Chair: Ms. Cindy Grier, cindy.grier@us.army.mil
Co-Chair: Rochelle Anderson, rochelle.a.anderson@us.army.mil
Advisor: Paul Works

Panel Discussion:
"Report from the Front:" Joint Warfare Analysis from the Combatant Commander's Perspective

Ms. Cindy Grier, USA TRADOC Anlysis Center 255 Sedgwick Avenue Ft. Leavenworth,KS 66027 816-383-1425 Cindy.Grier@us.army.mil	**Ms. Rochelle Anderson, USA** TRADOC Analysis Center 255 Sedgwick Avenue Ft. Leavenworth,KS 66027 913-684-7585 Rochelle.A.Anderson@us.army.mil

With joint forces from our combatant commands engaged in operations ranging from combat to humanitarian relief on a global basis, assessing their effectiveness is a broad and complex issue. This panel discussion will focus on the use of analysis at combatant command headquarters level and the analytic needs of our joint commanders. Senior representatives from combatant commands will discuss how OR is supporting them at the “tip of the spear,” presenting a brief overview of how they are using analysis and how their analysis needs might be better met. The participants will reflect on the state of OR, where it is working effectively and where it may be falling short. The session will include a moderated discussion with the opportunity for attendees and panel members to interact.

Preliminary Agenda for Composite Group D - Resources/Readiness/Training

Chair: Mr. Norm Reitter, reittern@ctc.com
Co-Chair: Touggy Orgeron, Center for Army Analysis,
Co-Chair: John J Kearley, Dynamics Research Corporation, jkearley@drc.com

Panel Discussion of Current Force RESET Issues Facing our Military Today and in the Future

Mr. Norman Reitter CTC 100 CTC Drive Johnstown,PA 15904 814-269-2516 reittern@ctc.com	**Maj Matt Reuter, USMC** Logistics Studies and Analysis Office, HQMC I&L 2 Navy Annex Washington,DC 22142 703-695-8800 matthew.reuter@usmc.mil	**Mr. Joe Mata,** HQDA DCS G-8 **COL Dan Williams, USA** OSD-ATL

Force RESET is a hot topic for today's military. Forward operations in Afghanistan, Iraq, Africa, and other global locations has stretched our military forces to the point where we must use the most efficiency in resourcing to meet Force RESET timelines that meet a required level of operational readiness. Meeting Force RESET timelines is challenging now and will be for years to come as we continue to support global operational requirements. This panel discussion includes representatives from the Office of the Secretary of Defense, the Army, and the U.S. Marine Corps Headquarters Staffs that will present Force RESET issues from their perspective and provide answers to questions from audience participants. This is a great opportunity for the military operations research community to hear about how we can support these critical issues in maintaining a strong forward military operational readiness posture.

Preliminary Agenda for Composite Group E - Acquisition

Chair: Dr. Frank Gray, OSD, Frank.Gray@jte.osd.mil
Co-Chair: Greg T Hutto, 46 Test Wing, Gregory.Hutto@eglin.af.mil

Operations Research Analysis in Future Defense Acquisition

Dr. Frank Gray, OSD
Frank.Gray@jte.osd.mil

Approved abstract unavailable.

Preliminary Agenda for Composite Group F - Advances in Military Operations Research

Chair: Mr. Brian Nichiporuk, briann@rand.org
Co-Chair: Chris Herstrom
Co-Chair: Simon Goerge
Advisor: Rob Albright

Strategy, Policy, and the War on Terror: Understanding and Exploiting System Dyn

MAJ Nathan A Minami, USA
Department of Systems Engineering
United States Military Academy
West Point,NY 10997
845-938-5525
DSN: 938-5525
FAX: 845-938-5665
nathan.minami@us.army.mil

Five years into the War on Terror, there appears to be little progress globally in eradicating terrorism despite great efforts by numerous countries and U.S. government agencies. The intent of this study is to examine terrorism on a systems level, using System Dynamics Modeling to help better understand the complex non-liner feedback and delays inherent in the system. Simulation of the model provides numerous insights that may help create and direct future strategy and policy. This paper will discuss the literature and data collected and used in model formulation and calibration, and will discuss the insights found from model simulation. Among these insights is the importance of addressing the root causes of terrorism such as political isolation, poverty, governmental oppression and perceived unfairness in U.S. policies. This paper also offers insight as to how the military and other governmental agencies might better be applied in the War on Terror.

Applications of Adversary Modeling to Information Operations (IO) and Cyber Operations

Mr. Michael Kretzer, USAF
Air Force Information Operations Center
102 Hall Blvd, Ste 311
San Antonio,TX 78243
210-977-2094
DSN: 969-2094
FAX: 210-977-5474
mike.kretzer@lackland.af.mil

Dr. Janos Sztipanovits
Institute for Software Integrated Systems
Vanderbilt Univers
VU Station B, Box 1829
Nashville,TN 37235
615-343-7572
janos.sztipanovits@vanderbilt.edu

Dr. Alexander H Levis
George Mason University
261 Science and Technology Building II,
Fairfax,VA 22030
703-993-1619
alevis@gmu.edu

A long term shortfall in modeling/simulation efforts of IO/Cyber effects has been the impact on the human aspect related to the operator, crew interaction, and hierarchical organization. The talk will address a project called the C2 Wind Tunnel (C2WT) which provides an integration environment for various models and data sources. The C2WT allows for controlled and repetitive runs to look at integrated kinetic and non-kinetic effects in support of the operational and tactical levels. The current experiment is combining proven engineering level IADS and Communications models with an organization model (CAESAR III) that represents the decision making process in an Air Operations Center. This effort will allow for course of action development and evaluation that takes into account both the behavior and performance of the physical equipment and network as well as human processes in the execution of the observe, orient, decide, and act portions of the scenarios (the human piece). Two scenarios that show near term promise are tied to Counter- Integrated Air Defense (CIADS) and non-kinetic effects on time sensitive targets (TST). The brief will address the use of the wind tunnel in IO experimentation, exercises, risk reduction, tactics, techniques and procedures as well as course of action development tied to the CIADS and TST scenarios.

Effectiveness of Psychological Influence Calculator (EPIC) Methodology Overview

Mr. Bud Whiteman
USSTRATCOM
500 SAC Blvd.
Offutt,NE 68113
402-294-6340
whitemab@stratcom.mil

The military operations community has been estimating the effectiveness of planned or contemplated kinetic operations for decades. A comparable process has long been sought for non-kinetic military actions including psychological operations (PSYOP) and other operations seeking to influence human perceptions and behavior. Estimating the effectiveness of a PSYOP campaign, or even an individual PSYOP product is recognized to pose a challenge to traditional, quantitative analytical methods. Human response to cognitive stimuli is difficult to predict, particularly if the same certainty as physics-based analytical methods of kinetic effects is desired. However, general principles of behavioral analysis and a careful study of the culture, environment, and circumstances of the intended Target Audience can be used to provide the military decision maker some standardized insight and relate a sense of effectiveness expectation of proposed PSYOP products and their underlying arguments. The Effectiveness of Psychological Influence Calculator (EPIC) application has been developed to provide this predictive analysis with included uncertainty estimates based on the clarity, objectivity, and pedigree of input data. The EPIC methodology and application seeks to provide some objective and repeatable decision support analysis to bring value to the decision maker in a context that promotes integration of PSYOP capabilities into comprehensive warplans. The methodology is intended to describe a structured framework which subject matter expert (SME) assessments can be leveraged to provide some valuable metrics to guide decision makers in selecting between alternative courses of action (COA) or trade-space studies of various strategies and tactics. As supporting empirical effectiveness data becomes more broadly collected, consolidated, and analyzed, this application may then also be used to make assessments as to the absolute value or effectiveness of a product, series, or likelihood of objective satisfaction. The EPIC methodology and application provides the user with a structured framework for analysis supporting:

- Selection between alternative PSYOP COAs based on relative effectiveness metrics;
- Identification of strengths and weaknesses of PSYOP plans, products, and tactics;
- Generalized trade-space studies between PSYOP operations and other operations with similar objectives; and,
- When available, leverage empirical effectiveness data to estimate the absolute likelihood of meeting PSYOP objectives.

Preliminary Agenda for Poster Session
Chair: Duane Boniface, DBoniface@absconsulting.com

Risk Assessment and Management Challenges in DHS Resource Allocation
Mr. Mark Hanson

Approved abstract unavailable.

Tutorials

Monday, Tuesday, Wednesday and Thursday, 9 -12 June 2008

Preliminary Agenda for Tutorials

Chair: Mr. Greg Hutto, gregory.hutto@eglin.af.mil
Chair: Mr. Mike Garrambone, mike.garrambone@gd-ais.com

Monday Tutorials, 9 June 2008

0800 – 1200 ***Tutorial and Overview of Agent-based Modeling and Simulation and Complex Adaptive Systems***
Dr. Charles M Macal and Dr. Michael J North, Argonne National Laboratory

Agent-based modeling and simulation (ABMS) is a novel approach to modeling systems comprised of interacting autonomous agents based on the complex adaptive systems (CAS) paradigm. ABMS is an attractive technique because it lends itself to modeling the dynamics of social interaction and social processes. ABMS is finding widespread application in many areas from the modeling of supply chains and logistics systems, to predicting the spread of epidemics and the diffusion of public information, from identifying factors in the fall of ancient civilizations to understanding contemporary urban conflict, from modeling consumer purchasing behavior to flexible manufacturing operations, to name a few. Defense related areas of ABMS applications include net-centric warfare, combat, command and control, logistics, DIMES-PMESII, and others. Computational advances have made possible a growing number of agent-based applications in a variety of fields at ever-increasing scales. This full-day, hands-on tutorial and overview presents the foundations of CAS and ABMS, approaches for developing agent models from spreadsheets to agent software toolkits, the relationship between ABMS and traditional modeling techniques, and the special challenges for ABMS pertaining to the need for agent data, theories of agent behavior, and validation requirements. The tutorial will be hands-on using Excel spreadsheets and the Repast agent-based modeling toolkit.

0800 – 1200 ***Design of Experiments***
Dr. James R Simpson, 53 TMG, Mr. Greg Hutto, 46 TW

For the past 8 years, the Air Combat Command's 53 Wing has been using Design of Experiments (DOE) as its principal method of test, with great success. Benefits include faster tests, fewer test resources, and greater system understanding all while increasing the confidence in test results. From digital simulation to engineering-oriented hardware-in-the loop, to operational flight test, we're now using DOE in nearly all tests. This four- hour tutorial will introduce attendees to DOE -- a powerful methodology for test and evaluation. We address the history of DOE, compare it to other popular test strategies, and describe a four-step process to simultaneously deal with more that one variable (e.g., weather, target signatures, aircraft profile, threat scenario, etc.) and their effects on the MOE or response variable.

Finally, we outline a method to deploy it throughout an organization. The attendee will be able to design simple factorial experiments with up to 4 variables, know what kinds of designs novices should avoid (Scenarios, One Factor At a Time, Taguchi, Plackett Burman, D-optimal), and know when to look for help. Interested students might include:

Operations analysts, scientists, engineers, mathematicians, and technical supervisors responsible for projects involving experimentation, R&D, test and evaluation, qualification, or digital simulation. Prerequisites: current familiarity with applied statistics through the t-test is helpful but not required. Attendees will be supplied with course slides, reference papers, an annotated bibliography, Web links and a list of contacts for further information.

1300 – 1700 ***Introduction to Linear Programing with Excel Solver and VBA***
1st. Lt Corban H Bryant, USAF, 28 TES/EAA

As the Imperial Fleet is amasses strength to track down and crush the Rebel Alliance, the resourceful Rebellion rushes to find an optimal product mix of star fighters to sustain its desperate struggle against the Empire. Rescue the Rebellion with your expert use of Linear Programming (LP), Excel Solver, Visual Basic for Applications (VBA), and Legos!

This tutorial gives a practical, hands-on introduction to LPs, Excel Solver, and VBA. We will program and solve a variety of practice problems as well and interactively build a VBA program to solve LPs iteratively, changing input data and graphing results. Laptops required for this tutorial with Solver, Analysis ToolPak, and Analysis ToolPak-VBA add-ins loaded in Excel.

1300 – 1700 ***Design of Experiments for Real-World Problems***
Dr. Thomas A. Donnelly, US Army Edgewood CB Center

Building on the introductory Design of Experiments (DOE) tutorial, this half-day seminar will demonstrate solutions to many real-world DOE problems.
Issues addressed and topics discussed include:

1) Repairing a broken design
2) Constraining designs to avoid unworkable variable settings
3) Building a design sequence to support increasingly complex models
4) What designs to use when variables have differing numbers of levels
5) Special designs for formulation of mixture variables
6) Special designs for experiments run on computers (simulations)
7) Designs for use when you only get one-shot to characterize a process
8) Simultaneously optimizing multiple responses – i.e. determining the best tradeoff in performance among several characteristics
9) Leveraging the principles of factor sparsity and factor heredity
10) Using data transformations to simplify and improve the analysis

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11) Where to take checkpoints and how best to use them in the analysis

Attendees will be supplied with course slides, reference papers, an annotated bibliography, Web links and a list of contacts for further information.

1300 – 1700 ***Fundamentals of Military Wargaming: An Operations Research Perspective***
Mr. Michael Garrambone, General Dynamics

We know that Military Wargaming is one of the tools of the Operations Research Analyst, but we also know it is not the shiniest one. It does not get the depth of training the others tools get, and gets less "stick time" than the other tools often because the results from using this tool are not strongly analytical or have robust statistical significance. None-the-less, wargaming is very useful because it provides insights into operations and processes that cannot be touched by other OR techniques. Through wargaming we find blind spots, strategies, and many outstanding questions that require solid analytical work. Thus wargaming is included in MORS working groups and is widely employed throughout the Government. Wargaming has recently been highlighted in two MORS's heavily attended workshops. The tutorial being presented is designed for the novice who is interested in wargaming. It provides fundamental understandings about Military Wargaming from the Operations Research Analyst perspective. This perspective is different for OR types in that the traditional shedding of light that analysts seek has had more to do with the outcome of simulations whereas the conflict gaming impact concentrates on what the player learns from the game and what they do with the knowledge gained. To get the "flavor" right for analysts this tutorial has four parts. The first part concentrates on fundamental OR simulation knowledge that supports wargaming and talks to items as game elements, structure, rules, data, and procedures. It concentrates on the parts of the game that analysts need to understand to assist in game design. Part two concentrates game characteristics and speaks to the phases, design considerations, play sequences, and strengths and limitations. This highlights aspects of wargaming that you must understand including conceptual dangers and common misuses for analysts. The third presentation describes the wargame environment and roles and responsibilities for sponsors, controllers, players, and analysts. Lastly the attendee gets into actual game play which has to be limited because it can be "too" interesting. If you are new to wargaming or are looking to patch holes in your background or experience, you will definitely enjoy this tutorial.

1300 – 1700 ***Markov Chain Analysis for a Pursuit / Evader Problem***
Dr. David Jeffcoat, AFRL/RWGN, Dr. Don Grundel, AAC/671 ARSS

This tutorial will provide an introduction to Markov chains. Markov chains have a rich and varied history in operations research but have been often overlooked as an important tool in the military operations research toolbox. As examples of important and timely applications, Markov chains are applied to problems such as war gaming, searching for moving time-critical targets, minesweeping, and force structure analysis. A particular application that is examined in this tutorial is a pursuit / evader problem in which the goal is to find a terrorist in a building. The tutorial consists of approximately equal parts lecture and hands-on exercise. Students will learn to model a pursuit / evader scenario by defining the state space and constructing a transition rate matrix. Students will derive steady-state probabilities for the evader's location using basic linear algebra functions in Microsoft Office Excel. For time-critical scenarios in which an initial location of the evader is known, students will derive functions describing how the probability of the evader's location evolves over time. Students are encouraged to bring a laptop computer with Excel.

1300 – 1700 ***Design of Experiments for Simulation Modeling***
Dr. Averill M Law, Averill M. Law & Associates

Discrete-event and agent-based simulation models often have many input factors, and determining which ones have a significant impact on performance measures (responses) of interest can be a difficult task. The common approach of changing one factor at a time is statistically inefficient and, more importantly, is very often just incorrect, because for many models factors interact to impact on the responses. In this two-hour tutorial, we present an introduction to design of experiments (DOE), whose major goal in simulation modeling is to determine the important factors with the least amount of simulating. We discuss a simple and widely applicable approach to performing DOE in the context of simulation modeling, whereas methods based on classical statistics (i.e., ANOVA) make assumptions such as constant variances and normally distributed errors that are often not valid for simulation models.

How to Validate Your Models and Simulations
Dr. Averill M Law, Averill M. Law & Associates

In this two-hour tutorial we present techniques for building valid and credible simulation models. Ideas to be discussed include the importance of a definitive problem formulation, discussions with subject-matter experts, interacting with the decision-maker on a regular basis, development of a written assumptions document, structured walk-through of the assumptions document, use of sensitivity analysis to determine important model factors, and comparison of model and system performance measures for an existing system (if any). Each idea will be illustrated by one or more real-world examples. We will also discuss the difficulty in using formal statistical techniques (e.g., confidence intervals) to validate simulation models.

Tuesday, Wednesday, and Thursday Tutorials – 10 - 12 June 2008

Thomas A. Edison: Naval Analyst

Mr. Michael W Garrambone
General Dynamics
5200 Springfield Pike, Suite 200
Dayton,OH 45431
937-476-2516
FAX: 937-476-2900
mike.garrambone@gd-ais.com

By popular request, we bring back this year the tutorial on the most famous inventor of our times, Thomas Alva Edison. Edison was self-educated, a firm believer in the scientific method, and had an incredible investigative mind. He was a man of great rigor and displayed an exceptionally successful work ethic. But little is known about his untiring devotion to duty as a World War I Military Operations Research Analyst and his successful leadership of the Naval Consultant Board of the United States. Before World War I, he was renowned as a highly successful inventor and industrialist who expressed concerns for the national military preparedness, the use of "machines" in warfare, and the economic use of limited resources for the defense of this country. Requested by the Secretary Daniels to head this military advisory board, he left his laboratories, rolled up his sleeves, and became a military analyst performing studies along with specialty teams drawn from his board of 24 of the most prominent scientists, engineers, and industrialists in the US. Edison was chosen for his popularity, inventiveness, and spirit, but analytical work is where he draws our attention. He was by any standards a "strange cat.' He had scientific methodology on his side, a desire for understanding tactical and operational warfare, and was "mind free" in offending any authority. Come to hear about Edison's naval studies, how he diligently conducted his work, and what he had to say about what he found. You will discover how he put his day-job aside and joined the navy (unpaid of course) working issues and creating inventions throughout the war. We will discuss how he went to sea to gain had first hand operational knowledge of environmental and technical data. We will talk about the methods he used to perform analyses which became the forerunner techniques of WWII analysts. No warrior analyst today should pass up this presentation. If you are interested in OR history, love discovery and political controversy, and enjoy light-hearted and important discussions on wartime analysis (lesson recorded-but not learned-yet relearned) then you will want to attend this tutorial.

How to Avoid Misapplication of the Monte Carlo Method

Mr. Leo H Jones, Mr. Newton Love, Mr. Steven Stegmann
Approved abstract unavailable.

Historical Bomber Self Defense Tutorial

Mr. Michael W Garrambone
General Dynamics
5200 Springfield Pike, Suite 200
Dayton,OH 45424
937-476-2516
FAX: 937-476-2900
mike.garrambone@gd-ais.com

Mr. Timothy W Ewart,
AFRL/RBCD, Air Vehicle Control Directorate
2140 Eighth Street, Bldg 146
Wright Patterson AFB,OH 45433
937-904-6539
FAX: 937-255-9746
Timothy.Ewart@wpafb.af.mil

Mr. Chris R Linhardt,
General Dynamics
5200 Springfield Pike, Suite 200
Dayton,OH 45431-1255
937-255-8629
FAX: 937-476-2900
chris.linhardt@wpafb.af.mil

This tutorial describes the key aspects of bomber self defense based on fundamentals of combat aircraft survivability design and analysis. The discussion is based on Robert E. Ball's authoritative book which was used to perform the Integrated Air Vehicle Self Defense (IAVSD) Bomber Study as part of the Air Force Research Laboratory historical research effort designed to understand the precedent for self defense on all heretofore US bombers. The tutorial is structured to provide insights on bomber self defense looking at the earliest air machines through to the current versions of the today's long range strike platforms. This tutorial is structured for the novice and begins with understanding the basic factors which affect mission performance and the design considerations. We examine various tactics, techniques and procedures used to enhance the survivability of engaging aircraft. We will begin looking at the World War I aircraft and talk about the various defensive designs used over time. The tutorial talks about fundamental concepts of aircraft survivability analysis discussing many of the famous air platforms of each era from WWI to the latest Northrop B-2 Spirit, first delivered in December 1993. The intent is to provide indispensable information on self defense considering system designs. The discussion covers operational requirements and system threat assessments. The presentation is unclassified and describes susceptibility, vulnerability, and the use of aircraft countermeasures. The information obtained will be used to look at self defense for the Next Generation Bomber.

Demonstration of Algernon Wargame

Mr. Mike Ottenberg, OSD
OSD/PA&E/SAC
1225 S. Clark St., Ste 300
Arlington,VA 22202
703-699-2340
michael.ottenberg.ctr@osd.mil

OSD/PA&E/Simulation and Analysis Center has worked with project partners to develop a tool, the Algernon automated wargame, designed to inform decisionmakers on the key variables in irregular warfare analysis. The tool was showcased at the December 2007 MORS workshop. This demonstration is designed to reengage with the MORS analytical community. The primary scenario demonstrated will be unclassified; however, the tool is being developed to inform classified analytical agenda scenarios.

Joint Munitions Effectiveness Manuals Weaponeering System 2.0 – JWS 2.0

Ms. Jessica Stalnaker, USAF	**Ms. Cameron McAllister, USAF**	**Mr. Greg Wilder, USAF**
Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-883-5278 DSN: 875-5278 FAX: 850 882-9049 jessica.stalnaker@eglin.af.mil	Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-882-4342 DSN: 872-4342 FAX: 850-882-9049 cameron.mcallister@eglin.af.mil	Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-882-3722 DSN: 872-3722 FAX: 850-882-9049 greg.wilder@eglin.af.mil

The Joint Munitions Effectiveness Manuals Weaponeering System (JWS) is the Tri-Service approved operational-level weaponeering tool. It calculates the effectiveness of a broad range of inventory weapon target combinations. Operational units are the main JWS user. However, it is also used directly and indirectly across the OR community. It is frequently the foundation of munition studies, including those that set inventory requirements and establish capability shortfalls. JWS development and maintenance is sponsored by the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME).

JWS 1.2 was released in August 2007. The main weapon-target effectiveness methodology in JWS 1.2 and previous versions is the JMEM Open-Ends Methods (OEMs). They were developed for MK-series munitions and provide an appropriate level of fidelity for determining the effectiveness of these munitions.

JWS 2.0 combines the air-to-surface and surface-to-surface weaponeering tools into one product. With this change and the move toward smaller and more accurate munitions, the OEMs no longer provided adequate fidelity. For this reason the main effectiveness methodologies for JWS 2.0 are the higher-fidelity methods found in the Joint Mean Area of Effects (JMAE) and Matrix Evaluator (ME) tools.

To introduce this new tool to the OR community, we will provide a summary of the methodologies changes as well as a demonstration of the software, including calculating effectiveness of several sample cases.

Advanced Collaborative System Optimization Modeler (ACSOM)

Mr. Stephen H Rapp	**Mr. Douglas R Rogers**	**Mr. Gregory D Hartman**
General Dynamics Land Systems 38500 Mound Road Sterling Heights,MI 48310 586-825-4963 FAX: 586-825-5075 rapps@gdls.com	General Dynamics Land Systems 38500 Mound Road Sterling Heights,MI 48310 586-825-5264 FAX: 586-825-5075 rogersd@gdls.com	General Dynamics Land Systems 38500 Mound Road Sterling Heights,MI 48310 586-825-5454 FAX: 586-825-5075 hartmang@gdls.com

The Advanced Collaborative System Optimization Modeler (ACSOM):

1) Creates A Set of Balanced, Feasible, Non-dominated, Whole-system Design Solutions
2) Displays model information so that System Performance and Allocation Thresholds from DoD Requirement Documents (MNS/ORD/CDD) can be assessed
3) All done within minutes by using a non-specialized PC that
a) Considers Full Spectrum of Subsystem Options
b) Prevents Infeasible Combinations of Subsystems
c) Finds a set of Balanced Solutions, Performance versus Burdens
4) Also provides a direct solve extension to the combinatorial model that finds a single vehicle alternative by using multi-objective optimization balancing all criteria

ACSOM is a COTS-based system using a SQL Server Desktop front end to provide a database with GUI for the Decision Analysts. The core of ACSOM uses the MPL Algebraic Modeler and the CPLEX Solver to generate solutions. The SQL Server Desktop also creates on the back end a sharable Excel Analysis Tool for customers, managers and engineers to manipulate the results and conduct "what if" analysis.

ACSOM has provided dramatic results in the Abrams, Stryker and Future Combat Systems programs and is the premier Whole System Trade Study Tool for General Dynamics Land Systems.

Do you SEE what I am SAYING...?

Dr. Rafael E Matos, USN

Approved abstract unavailable.

Demonstrations – Tuesday and Wednesday, 10 - 11 June 2008

Preliminary Agenda for Demonstrations

Chair: Maj. KiraBeth Therrien, USAF, Kirabeth@verizon.net

Co-Chair: Maj Jonathan Steckbeck, USAF, HQ USAF/A9, jonathan.steckbeck@pentagon.af.mil

Introduction to the Operating and Support Cost Analysis Model (OSCAM)

Ms. Mary M Mertz, USN, Mr. Geoffrey Pawlowski, USN

The Operating and Support Cost Analysis Model (OSCAM) is a family of tools developed and sponsored by the Naval Center for Cost Analysis to estimate operating and support (O&S) costs for current and future Naval weapon systems. The US OSCAM family of models includes: OSCAM Ship, OSCAM Shipboard Systems, OSCAM Air, OSCAM EFV, and OSCAM USAF. OSCAM is a system dynamics-based model, which provides a structured methodology for dealing with complex systems having many interacting components. This approach enables the user to capture the dynamic behavior of a system while allowing for a flexible design, which can easily be enhanced and expanded. For example, the model provides the capability to quickly assess the impact of different maintenance philosophies and OPTEMPO scenarios on cost and availability. Model outputs include cost, availability, and man-hours, as well as other metrics. One of the features that sets OSCAM apart from most cost estimating models is that historically-based data sets are provided with the model. These data sets are primarily based on data from the Naval Visibility and Management of Operating and Support Costs (VAMOSC) database and are updated annually. OSCAM has been used to develop program life cycle cost estimates, proposal evaluations, source selections, analysis of alternatives, and in numerous what-if drills and scenarios. The model and model training are currently offered free of charge to government personnel and government sponsored contractors. OSCAM Ship, Shipboard Systems, and Air are certified for use on the NMCI network. More information on OSCAM can be found at www.oscamtools.com.

This presentation will focus on providing an introduction to the OSCAM tool, particularly the model's capabilities and its applications throughout DoD.

Systems Effectiveness Analysis Simulation (SEAS)

1st. Lt Christopher G McChesney, USAF

The System Effectiveness Analysis Simulation (SEAS) is government-owned, military utility analysis tool sponsored by the Air Force Space and Missile Systems Center's Development Planning Directorate (SMC/XR). The SEAS tool was designed specifically to give military operations research analysts and decision makers a flexible means to quickly explore new warfighting capabilities; in particular, those provided by Space and C4ISR systems. SEAS represents the latest in analytic simulation technology and offers a stochastic, Monte Carlo, agent-based modeling and simulation environment in which small to large-scale joint warfighting scenarios can be constructed and explored to quantify the effectiveness of various system designs, architectures, and concept of operations (CONOPS). The ability to represent networked military units and platforms reacting and adapting to perception-based scenario dynamics in a 3-D physics-based battlespace, makes SEAS ideally suited for exploring effects-based operations, network centric warfare, and transformational warfighting concepts. SEAS is part of the Air Force Standard Analysis Toolkit and the Air Force Space Command Modeling and Simulation Toolkit. It is frequently used by Air Force, Army, OSD, and support contractors to evaluate new systems, force mix, and tactics. Demo will include live runs of unclassified scenarios.

Demonstration of Algernon Wargame

Mr. Mike Ottenberg, OSD

OSD/PA&E/Simulation and Analysis Center has worked with project partners to develop a tool, the Algernon automated wargame, designed to inform decisionmakers on the key variables in irregular warfare analysis. The tool was showcased at the December 2007 MORS workshop. This demonstration is designed to reengage with the MORS analytical community. The primary scenario demonstrated will be unclassified; however, the tool is being developed to inform classified analytical agenda scenarios.

Demonstration of Irregular Warfare (IW) Pythagoras Modeling Suite

LT Robin Marling, USN, Mr. Steve Upton, USN, Mr. Edmund J Bitinas, Dr. Bob Sheldon

This demonstration will include the latest version of Pythagoras and its supporting tool suite, i.e., Pythagoras 2.0, the Rapid Scenario Generation (RSG) tool, and the Design of Experiments (DOE) tool.

Pythagoras is an agent-based modeling environment, providing the user with a host of optional capabilities, rules and behaviors to describe an agent. The new capabilities that it introduces include soft decision rules, dynamic sidedness, behavior-change triggers, non-lethal weapons, and variable attributes. Variable attributes, new to version 2.0.0, can be used to trigger new behaviors, and can be changed by weapons, communications, events or the terrain itself.

The RSG tool reduces the time required to develop an executable scenario file through the reuse of developed and approved simulation objects. The intent of this effort is to develop a generic front-end scenario development tool that might be used with any number of simulation models.

The DOE tool reduces the development and execution time for computational experiments that involve large numbers of factors by providing a generic front end interface to guide the analyst through the construction of an experimental design and facilitate that design execution in a high performance computing (HPC) environment.

Space Analysis Resource Portal (SARP) and the Authoritative Data (AD) functionality

Ms. Kathy M Gue, USAF, Dr. Lee L Leber, USAF, Ms. Kathie Reece, USAF

Air Force Space Command (AFSPC), Directorate of Analysis, Assessment, and Lessons Learned (A9) has created a Space Analysis Resource Portal (SARP) to support space operators, analysts, and planners. During our presentation, we will overview the goals for the SARP, showcase its contents, share challenges in populating the Portal with current and useful information, and attempt to garner user requirements and recommendations on how to make it more useful to the space community.

SARP supports registered users and provides the capability to store detailed information about space models and simulations and studies associated with those models/simulations. We are currently working with internal and external organizations and commercial companies to update SARP with model, study, and space data information. There are 49 M&S models/tools listed in SARP and we want it to provide current and usable databases, tool overviews, and lessons learned to the space community. The purpose of the Authoritative Data (AD) functionality within SARP is to provide analysts, testers, trainers, system acquirers, wargamers, and exercise planners with authoritative space system information and data. The Portal is available on both the Non-secure Internet Protocol Router (NIPRNet) - https://halfway.peterson.af.mil/SARP - and the Secret Internet Protocol Router Network (SIPRNet) - https://sarp.afspc.af.smil.mil - components.

During our presentation we will overview SARP's content to include its hyperlink capabilities, database interfaces, study reports, user and specific space metrics and ways it can support quick-turn analyses. We will also facilitate discussion s regarding potential sources and possible opportunities to pull data from AD sources, push current data to space related databases, and recommendations regarding interface designs to support space analysts and planners.

Enigma — a Rated Management Tool

Maj. Jonathan Steckbeck, USAF

AF/A9, A1M and A3O developed a desktop decision support tool called ‘Enigma’ that allows senior-level decision makers to quickly examine the impacts and effectiveness of potential rated management policy decisions.

Through real-time analytic calculations, the Enigma tool demonstrates how carefully the Air Force must balance rated officer production with resource constraints in order to prevent degraded training and inadequate development of future generations of pilots, navigators and air battle managers. Enigma provides insight into required rated production numbers to sustain future rated force requirements.

This presentation and interactive model demonstration will highlight what differentiates Enigma from previous rated management tools. In seconds, the Enigma tool can consider how changes to any of the 5,000 input variables impact the rated management system inventories and requirements. Variables include aircraft inventory, crew ratios, experience mixes, initial rated inventories, rated officer production, aircraft aircraft standard utilization rates, experience requirements, continuation rate, and emerging staff requirements. Manipulating these variables allows for consideration of virtually any scenario. Enigma's results are of interest to offices which determine operational training requirements or schedule sorties.

Naval Aviation Maintenance and Supply Model

Mr. Chuck Meador, USN, Mr. Tony Kimberland, USN

Approved abstract unavailable.

Joint Analysis System (JAS) Demonstration

Mr. Peter Melim

Approved abstract unavailable.

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Composite and Working Group, Focus and Other Sessions PRELIMINARY Agendas

Preliminary Agenda for Composite Group A - Strategic and Defense
Chair: Ms. Rachel Echternach, echternr@stratcom.mil
Co-Chair: Ms. Karen Phipps, phippsk@stratcom.mil

MIT/Lincoln Labs Kill Web, Maj. David Pugh, USAF
Global Sensor Management Decision Support Tool, Maj. David M Pugh, USAF, Capt. Ryan Kappedal, USAF

Preliminary Agenda for Working Group 1 - Strategic Operations
Chair: Mr. Lalit Yudhbir, lyudhbir@spa.com
Co-Chair: Mr. Gene Schroeder
Advisor: Ms. Karen Phipps, phippsk@stratcom.mil

Regional Strategic Intelligence Assessments, Capt. John Syphrit, USAF, Mr. John Borsi, USAF
Emerging Worldwide Threats, Maj. Taylor Krenkel, USAF, Maj. Anh Hinshaw, USAF, Capt. Jennifer Geffre, USAF
Power and International Conflict, Dr. Daniel S Geller
Strategy, Policy, and the War on Terror: Understanding and Exploiting System Dyn, MAJ Nathan A Minami, USA
Synthesizing Information for Senior Policy Makers using Simulation: Working through an EBO challenge problem with system, Dr. Corey Lofdahl
Adaptive Planning – Linkages with the Analysis Community, COL Paul Martin, USA, Col. Julian H Tolbert, USAF, Lt. Col. Michael "Kent" Taylor, USAF, Mr. Randy Wimmer, OSD
OHIO Class Guided Missile Submarine (SSGN): A Transformation in Strike Warfare, Dr. William J Browning, Mr. James H Patton, Jr.
AFRL Historical Bomber Self Defense Study, Mr. Michael W Garrambone, Mr. Timothy W Ewart, Mr. Chris R Linhardt
Strategic Impacts of the IED , Dr. Steve Riese
Organizing an Information Age Combat Force, LTC Sean Deller, USA
INTELLIGENCE SURVEILLANCE AND RECONNAISSANCE ASSET ASSIGNMENT FOR OPTIMAL MISSION EFFECTIVENESS, Capt. Ryan D Kappedal, USAF, Maj. August G Roesener, USAF, Maj. Shane N Hall, USAF
Detecting Change in Attack Trends in Operation Iraqi Freedom, MAJ John C Jackson, USA, MAJ Richard Bell, USA
Modifying Features in the Environment for Manipulating Enemy Behavior, Mr. Ben Holland
Effectiveness of Psychological Influence Calculator (EPIC) Methodology Overview, Mr. Bud Whiteman
A System Dynamics Approach to Strategic Communications Modeling, Mr. Craig Oeltjen
A Case Study in Integrated PMESII Modeling and Simulation, Mr. Nicholas J Pioch, Mr. James Melhuish, Mr. Michael F Cook
Credentialing: A Mechanism for Improving Operations Analysis and Operations Research Professional Development, Mr. Robert L Simons, Dr. Michael S McCoy

Preliminary Agenda for Working Group 2 - Nuclear, Biological, and Chemical (NBC) Defense
Chair: LTC Tom Rothwell, USA, thomas.rothwell@us.army.mil
Co-Chair: Guarang Dave, gaurang.dave@navy.mil
Co-Chair: Charlie Holman, charlie.e.holman@atec.army.mil
Co-Chair: Eric Lowenstein, eric.lowenstein@dtra.mil
Co-Chair: Laura Sears, laura.sears@dtra.mil
Advisor: James Gerding, jgerding@cnttr.dtra.mil

DDG-1000 INTERNAL DETECTOR PLACEMENT, Ms. Michelle L Adams
Analysis of the Operational Effect of the Joint Chemical Agent Detector Using the Infantry Warrior Simulation (IWARS), Mr. David B Gillis, USA, Mr. Kevin M Guite, USA, Mr. Carl M Eissner, USA, Dr. George E Steiger, USA, Mr. Charles E Holman, USA, Ms. Lynn A Coles
Evaluation of the Joint Service Lightweight Standoff Chemical Agent Detector , Mr. Charlie Holman, USA, Mrs. Georgeann Winslow, Mr. Robert L Berkowitz

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Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White
Studying Chemical Effects on Infantry Operations Using Agent-based Simulation , Mr. Gerald M Pearman, Dr. Tom Lucas, Mr. Victor Middleton, MAJ Jon Alt, USA, MAJ Rich Geren, USA
Benefits and Uses of a CBRN M&S Capability Integrated into the MATREX, Mr. Chris Gaughan, Mr. Tom Hurt, Mr. Joey Fann, Ms. Lana McGlynn
Estimating Performance of a Standoff Biological Detection System Against Actual Biological Warfare Agents, Dr. Kensuke Shirakawa, USA, Mr. Charlie Holman, USA, Dr. Carl T Russel
Agent Based Biological and Chemical Mass Casualty Event Modeling, Ms. Janelle L Blazier, Dr. Craig Newborn, Ms. Yen Andrews, Mr. Todd Burwell
The CREATIVE Decontamination Performance Model, Ms. Erin E Shelly, Dr. Brent Mantooth, Dr. Roger Davis, Mr. Joshua Combs
Exploring the WMD Enhancements within the Joint Analysis System (JAS), Mr. Peter B Melim, Mr. Walt Richert
Verification and Validation of Integrating the HPAC Model into the Joint Analysis System (JAS), Mr. Peter B Melim, Dr. John Prince
A ranking methodology for future investments in active interrogation technologies, Dr. Mihaela D Quirk, Mr. Lyndon Wrighten
Path to Improving Confidence in Collateral Effects Predictions, Dr. Martin B Richardson, Mr. Jay C Willis, Mr. William K Moore, Mr. Timothy J Cowles
Use of Multi-Criteria Decision Making for Selecting Chemical Agent Simulants for Testing, Mr. John Walther, USA, Ms. Lindsey Wurster, USA, Ms. Shawn Bowen, USA
Review and Assessment of Chlorine Mammilian Lethality Data and the Development of a Human Estimate, Mr. Douglas R Sommerville, USA, Ms. Sharon A Reutter-Christy, Ms. Erin E Shelly, Mr. John J Bray, Mr. Raymond E Jablonski
Evaluation of Urban Atmospheric Transport and Dispersion Models Using Data from the Joint Urban 2003 Field Experiment, Dr. Jeffry T Urban, Dr. Steve Warner, Dr. Nathan Platt, Dr. James F Heagy
To Protect and to Serve: Joint Collective Protection Test Standards , 1st. Lt Stacy M Baber, USAF
Plans for Comparative Investigation of Source Term Estimation Algorithms Using FUSION Field Trial 2007 Data, Dr. Nathan Platt, Dr. Steve Warner, Mr. Steve Nunes
Measuring the State of the Art in UGV Technology: the 2007 Joint Ground Robotics Urban Reconnaissance Experiment, Dr. Thomas Anderson, Mr. David Bruemmer, MAJ Manuel Ugarte, USA, Dr. Curtis Nelson
ConJoInt - Using Simulations to Assess Operational Impact and Determine COAs , Ms. Michelle L Adams
CCMRF Sufficiency Study - Spring 2008, Mr. Gregory H Pejic, OSD
Contamination of Drinking Water Distribution Systems by Release of the Bacillus anthracis Spore, Dr. Jon J Calomiris, USA

Preliminary Agenda for Working Group 3 - International Security and Proliferation
Chair: Mr. Hunter A Marks, USSTRATCOM/J811, hunter.marks@us.af.mil
Co-Chair: Pat McKenna, USSTRATCOM/J5, mckennap@stratcom.mil
Co-Chair: John Hummel, Argonne National Laboratory, jhummel@anl.gov
Advisor: Pat McKenna, USSTRATCOM/J5, mckennap@stratcom.mil

Session Theme: Nation State Stabilization **Robust Sensitivity Analysis of Courses of Action Using an Additive Value Model**, Mr. Hunter A Marks, USAF
Deterrence and Policy Analysis Workshop Report, Mr. Pat J McKenna
Deterrence Community of Practice – first meeting, Mr. Pat J McKenna
Session Theme: Emerging Societies/Nations **An Outbrief from the "Impact of Emerging Societies on National Security" Special Meeting**, Dr. John R Hummel, Dr. Theodore J Bennett, Jr.
Power and International Conflict, Dr. Daniel S Geller
Complex Adaptive System Comparative Analysis Dynamic Environment for Emerging Societies (CASCADE-ES), Dr. John R Hummel, Mr. John H Christiansen, Dr. Mark Altaweel, Mr. Dariusz Blachowicz
Session Theme: Joint IED Virtual WG **Strategic Impacts of the IED** , Dr. Steve Riese
Modeling Insurgent Values for IED Attacks, Dr. Andrew G Loerch, Dr. Kenneth Hintz, Dr. Kathryn B Laskey
IED ATTACKS, CONFLICT ENTERPRISE, AND SUSTAINED CONFLICT, Dr. Milt Pappas, LTC Robert D McKenzie, USA, Dr. Craig A Schultz
Session Theme: PMESII **"That's what Bob said" - Improving Assumptions In IW Tools – A Case Study**, Dr. James G Stevens, OSD, Ms. Danielle Miller, OSD
Social Science Foundations for GWOT Analysis, Dr. Yuna Wong, OSD
Using Operations Research for Deterrence Assessments in an Iranian Nuclear Scenario, Dr. Gregory S Parnell, USA, Dr. James Scouras

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Preliminary Agenda for Working Group 4 - Air and Missile Defense
Chair: Mr. Kelly Culpepper, klculpepper@raytheon.com
Co-Chair: Mr. Martin Goodman, martin.goodman@smdc.army.mil
Co-Chair: Dr. Nigel S Siva, Nigel.Siva@sparta.com
Co-Chair: Mr. Chris Foley, chris.foley@jhuapl.edu
Co-Chair: Mr. John Winkelman, john.r.winkelman@lmco.com
Co-Chair: Woody Bevill, woodrow.bevill@lmco.com
Advisor: Launa Zaffram, launa.zaffram@navy.mil

Analyzing the Effect of Information Attack on Air & Missile Defense Performance, Mr. Bart Paulhamus, Ms. Amy Castner
INTELLIGENCE SURVEILLANCE AND RECONNAISSANCE ASSET ASSIGNMENT FOR OPTIMAL MISSION EFFECTIVENESS, Capt. Ryan D Kappedal, USAF, Maj. August G Roesener, USAF, Maj. Shane N Hall, USAF
Path to Improving Confidence in Collateral Effects Predictions, Dr. Martin B Richardson, Mr. Jay C Willis, Mr. William K Moore, Mr. Timothy J Cowles
Joint Airspace Command and Control in Defense Planning Scenarios, Mr. Donald W Hinton, USA
MIT/Lincoln Labs Kill Web, Maj. David Pugh, USAF
Global Sensor Management Decision Support Tool, Maj. David M Pugh, USAF, Capt. Ryan Kappedal, USAF
Advanced Missile and Electronic Attack Effectiveness Analysis, Capt. Timothy Booher, USAF
Operational Assessment and Operations Tempo, Lt. Col. Kirsten Messer, USAF
Probability of Negation for Cruise Missiles Using Least Defendable Routes , Dr. Nigel S Siva, Dr. Sean K Collins, Mr. Paul A Bigelman
Joint Ballistic Missile Defense Inventory Sensitivity Analysis, Mr. Martin S Goodman, USA, Mr. Eddie Barber, USA, Dr. Steve Pierce, USA, Mr. James Braswell, Mr. Howard Parsons
Using IMDT Distributed Simulation for Interoperability Analysis of Aegis BMD Flight Test Missions , Dr. Hany M Aly, Mr. Arend W DeBolt, Dr. Joseph E Uzdzinski
Warfighting Payoff Analysis in Support of IHPRPT Beyond-Phase-III Goals, Mr. Paul F Mondragon
Ensuring Schedulability in the Weapon Target Assignment Problem, Ms. Deborah Pederson
An Analysis of Engagement Coordination Schemes for Integrated Fire Control, Mr. Christopher B Foley, Mr. Bart Paulhamus
An Extended Area Protective System (EAPS) Baseline Interceptor System Effectiveness Analysis, Mr. Robert H Vasse, Mr. David F Whitten
Who's in charge anyway?, Mr. Anthony J O'Connor
Pantelleria: The Modeling of Operation Corkscrew in World War II, Mr. Michael W Garrambone, Mr. Jeffrey A Dubois
AFRL Historical Bomber Self Defense Study, Mr. Michael W Garrambone, Mr. Timothy W Ewart, Mr. Chris R Linhardt
An Architecture Analysis Model Developed for the Evaluation of Forward-Based Sensors, Ms. Jaclyn Cichon, Mr. Matt Pickard, Dr. Patrick Friel, Ms. Jessica M Libertini
Improving Prediction of Forward-Based Radar Performance by Combining Surveillance and Track Metrics, Ms. Jessica Libertini, Dr. Patrick Friel, Mr. Daniel Simkin, Ms. Jaclyn Cichon
Seabasing and MPF(F) Capabilities in Support of Major Combat Operations (MCO) Ashore, Maj Gary J Loberg, USMC

Preliminary Agenda for Working Group 5 - Homeland Defense and Civil Support
Chair: Mr. Tom Denesia, Thomas.Denesia@northcom.mil
Co-Chair: Bob Clarke, Robert.Clarke@northcom.mil
Co-Chair: Julie Seton, jseton@astcorp.com
Co-Chair: Ms. Kim Warren, kwarren@mitre.org
Advisor: Jerry Diaz, Homeland Security Institute

Investigating Surveillance Strategies for Homeland Defense Against Air and Maritime Threats, Ms. Cherie D Gott, USAF
Sensor Performance Optimization Tool, Mr. James S Richardson
Strategic Forecasting of Russian Long Range Aviation Activity, Mr. Sean E Bourdon, Mr. Thomas E Denesia, USAF
Information Sharing Between Industry and Defense Community, Dr. James G Stevens, OSD, Ms. Suzy Majerich, OSD
Agent Based Biological and Chemical Mass Casualty Event Modeling, Ms. Janelle L Blazier, Dr. Craig Newborn, Ms. Yen Andrews, Mr. Todd Burwell
CCMRF Sufficiency Study - Spring 2008, Mr. Gregory H Pejic, OSD
U.S. COAST GUARD UNMANNED WIDE AREA SURVEILLANCE, LT Lee L Stenson, USCG, LT Anthony Hawes, USCG
Regional Maritime Domain Awareness Capability (RMAC) Technical Demonstration (TD-1) Results, Mr. Eduardo D Danganan, USN, Mr. Stuart Brown
Empowering Coast Guard Decision Makers Through the Use of the Maritime Security Risk Analysis Model , Mr. Matthew D Mowrer,

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LCDR Brady C Downs, USCG
Agent-Based Simulation of IED Blast and Shrapnel Effects, Mr. H. R Blacksten, Ms. Austin Zimmerman, Dr. Brett Steele, Dr. Philip Hammar, Dr. Doug Samuelson
Modeling Mass Dispensing of Prophylaxis using LPAT, Dr. Charles N Van Groningen, Mr. Paul Jr. L Hewett
A Model of Migration Choices for Undocumented Immigrants, Dr. Charles A Worrell
Using Cyber Intelligence Preparation of the Environment for Computer Network Defense, Ms. Mary Horejs, Mr. Jeffery Markey, Mr. Galo Medina-Ortiz, Dr. Christopher Degni
Transitioning Software Technologies from the U.S. Department of Defense to the U.S. Department of Homeland Security, Dr. Gerald M Powell, USA
Probability of Negation for Cruise Missiles Using Least Defendable Routes , Dr. Nigel S Siva, Dr. Sean K Collins, Mr. Paul A Bigelman
The Influence of Sharia Law on Intelligence & Law Enforcement , Mr. William Gawthrop
Contamination of Drinking Water Distribution Systems by the Bacillus anthracis Spore, Dr. Jon J Calomiris, USA
Maritime Domain Awareness: Process Reengineering, Ms. Susan G Hutchins, USN, Dr. Shelley P Gallup, USN, Dr. Doug MacKinnon, USN, CAPT Scot Miller, USN, Dr. Jared Freeman
Strategy, Policy, and the War on Terror: Understanding and Exploiting System Dyn, MAJ Nathan A Minami, USA
Network Risk Assessment Tool (NRAT), A Case Study, Mr. Bud Whiteman
Analytic Transparency – Improving Visibility, Transparency, and Accessibility for the DoD Analysis Community, Mr. Gray Gildner, OSD, Mr. Scott Ross, OSD
Analyzing the Requirements Generation Process for Navy Security Forces, LCDR Tom Bestafka, USN
A Model of Migration Choices for Undocumented Immigrants, Dr. Charles A Worrell

Preliminary Agenda for Composite Group B - C4ISR and Net-Centric Operations
Chair: Mr. Don Timian, donald.timian@atec.army.mil
Co-Chair: Mike Leite, michael.leite.ctr@osd.mil
Co-Chair: Ken Raab, ken.raab@us.army.mil
Co-Chair: Kyle Rogers, kyle.rogers@us.army.mil

Net Enabled Command and Control (NECC) , Ms. Laura Knight, OSD, CDR Paul Fink, USN
DCGS-A: Mission Evaluation Focus Areas; Analytical Framework for the Sensor Feeds, Intelligence Fusion, Networks (Intero, Mr. Teddie Outland, USA, Mr. John W Diem, USA

Preliminary Agenda for Working Group 6 - Battle Management/Command and Control (BMC2)
Chair: Ms. Peggy Gravitz, pgravitz@aegistg.com
Co-Chair: Stephen Conley, stephen.f.conley@us.army.mil
Co-Chair: Dwayne Hill, Dwayne.Thomas.Hill@us.army.mil
Co-Chair: LTC Rob Kewley, Robert.Kewley@usma.edu
Co-Chair: Mark Harter, mharter@mitre.org
Co-Chair: LTC Dale Henderson, Army, USMA, Dale.Henderson@usma.edu
Advisor: Mike Leite, michael.leite.ctr@dmso.mil

Sustainment Battle Command Research Program, Mr. Michael F Byrd, USA, Mr. Morris Hayes, USA
Analyzing Sustainment Battle Command Enablers via Layered Networks in Discrete Event Simulations, LTC Rich Spainhour, USA, Mr. Leroy Jackson
An Analytic and Functional Decomposition of Battle Command to Enable Cross Command M&S Development, Mr. Brian K Hobson
Interactive Army Campaign Plan, LTC Scott T Nestler, USA, Mr. Marc Eskew, USA
Global Force Management Data Initiative, LTC Ilean K Keltz, USA, Mr. George G Sprung, JCS, Dr. James G Stevens , OSD
An Resource Allocation Approach to C2, Dr. Steven Forsythe
Enabling replication and increased reliability of a small-scale Web Application for dynamic reporting and analysis, LTC Garrett D Heath, USA
Exploring the Impact of Information on Small Unit Force Effectiveness, CPT Clark C Adams, USA
Modeling the Impacts of Multi-faceted Attacks on New Triad-related C3 Networks, Mr. Chris Chartier, OSD, Mr. Elliott R Hunter, OSD, Mr. Rodney A Colton
Understanding Patterns of Team Collaboration Employed To Solve Unique Problems, Ms. Susan G Hutchins, Mr. Tony Kendall, USN
Joint Airspace Command and Control in Defense Planning Scenarios, Mr. Donald W Hinton, USA

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An Analysis of Engagement Coordination Schemes for Integrated Fire Control, Mr. Christopher B Foley, Mr. Bart Paulhamus
MATREX Providing Tools to Build Interoperable Network Centric M&S Environments, Ms. Lana E McGlynn, Mr. Tom Hurt, USA, Mr. Joe McDonnell
Network Centric Warfare Battle Command Multi-Fidelity Multi-Resolution Modeling and Simulation with MATREX, Mr. Sidney N Antommarchi
Blue SLAACM: a Stochastic Lanchester Air-to-Air Campaign Model for Blue Attack, Mr. Jeremy M Eckhause, Mr. Robert V Hemm, Dr. David A Lee
System Functional Analysis in a Capability Mapping Framework, Mrs. Laura J Byrd, Mr. Jason B Shreve
Understanding Information Uncertainty within the Context of a Net-Centric Data Model: A Mine Warfare Example, Ms. Megan Cramer
Command and Control of the Threat System Management Office's Threat Force, Mr. Robert Harvell, USA, Mr. Gary Fowler, Mr. Duard Stephen Woffinden, Mr. Emanuel M Tornquist III

Preliminary Agenda for Working Group 7 - ISR and Intelligence Analysis
Chair: Mr. Tim Elder, tim.elder@lmco.com
Co-Chair: Dr. Ronald Tuttle, Ronald.Tuttle@afit.edu
Co-Chair: CDR Eric Law, USN, OPNAV N81, eric.law@navy.mil
Co-Chair: Bryan Tollefson, USN, Surveillance Systems, CODE 56370, bryan.tollefson@navy.mil
Advisor: Don Timian, donald.timian@atec.army.mil

Applying ISR Mission Decomposition processes to Analyses of Alternatives (AoAs), Ms. Charita Petrina, USAF, Ms. Brandy Gorham
Mixed ISR Constellation Augmentation Strategy, Maj. Dan Jones, USAF, Mr. Todd Sterns
Space Radar Network Analysis , Mr. Paul A Page, Mr. Christopher L Rickard
Applying Crime Mapping and Analysis Techniques to Forecast Insurgent Attacks in Iraq, Capt Joseph Mlakar, USMC, Maj Paul Schneider, USMC, MAJ Andy Farnsler, USA, Mr. Douglas Hoffman, USMC
Identifying Socio-Cultural Spatial Signatures for Command-Wire IED Threats, Mr. Jeffrey Burkhalter, USA, Mr. Samuel Hunter, USA, Dr. Dawn Morrison, USA
Parametric Analysis of Target Tagging Effects on Irregular Warfare, Ms. Susan Hanson, Mr. Justin Nave, LTC John Crino, USA
Development of Analytical Models of Blue Force Interactions with Improvised Explosive Device Incidents, LTC Darryl Ahner, USA, LTC Rich Spainhour, USA
Employing Open Source Text Analysis for Extraction of Operationally Relevant, Spatially Referenced Socio-Cultural Data, Dr. Lucy A Whalley, USA, Mr. William D Meyer, USA, Mr. Timothy K Perkins, USA
If…Then…Now What: Analysis of Dynamic C4ISR Effects on Conventional Combat, Ms. Susan Hanson, LTC John Crino, USA, Mr. Chuck Burdick
Campaign Analysis: a Comparison of STORM and THUNDER in MCO-2, Mr. Ted K Broyhill, OSD
Using Cyber Intelligence Preparation of the Environment to Understand and Analyze Potentially the World's Most Dangerous, Ms. Heidi S Vecera, Ms. Megan Kirk, Mr. Carlton Shaw, Ms. Josefina Smart
Transitioning Software Technologies from the U.S. Department of Defense to the U.S. Department of Homeland Security, Dr. Gerald M Powell, USA
Designing Operational Tools That Foster Advanced Analytic Thinking, Dr. Gerald M Powell, USA
Littoral Combat Ship Anti-Surface Warfare Kill Chain Assessment, LCDR John L Krouse, USN
Modeling Uncertainty from Sensors to Decision Makers, LTC Darryl Ahner, USA, Dr. Thomas Anderson, MAJ Michael Martin, USA
Logistical Feasibility of a Postulated Threat Course of Action, Ms. Patricia Campbell, Mr. Arnie Warshawsky
Assessing Navy ISR Requirements , CDR Eric Law, USN
A Cognitive Analytical Approach: Problem Complexity, Indicators, & the Need for Signatures to Reveal Foreign D&D, Ms. Kathrine M Graham, Dr. Ronald F Tuttle, Dr. Jay B Jordan
A ranking methodology for future investments in active interrogation technologies, Dr. Mihaela D Quirk, Mr. Lyndon Wrighten
Soft metrics for decision analysis under uncertainty, Dr. Michelle D Quirk
Exploring the WMD Enhancements within the Joint Analysis System (JAS), Mr. Peter B Melim, Mr. Walt Richert
Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment, Mr. Eric S Harclerode, USA, Mr. Stephen L Colegrove, USA
INTELLIGENCE SURVEILLANCE AND RECONNAISSANCE ASSET ASSIGNMENT FOR OPTIMAL MISSION EFFECTIVENESS, Capt. Ryan D Kappedal, USAF, Maj. August G Roesener, USAF, Maj. Shane N Hall, USAF
Space Radar Time Critical / Time Dominant Analysis, Mr. Paul A Page, Mr. John G Zierdt
Assessment of Army's Need for Theater/Direct Down Link (T/DDL) and Dynamic Re-Tasking (DRT), Dr. Steve F Pierce, Mr. William M Tomlinson
Combat ID for Joint STARS: Shortening the kill chain from hours to minutes , Mr. David Toms

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Preliminary Agenda for Working Group 8 - Information Operations
Chair: Mr. Stephen R Orr IV, NSA, srorr2@mi.army.mil
Co-Chair: Col Robert Morris, robert.morris@us.af.mil
Co-Chair: Dr. Chris Degni, degnic@saic.com
Co-Chair: Maj Kenneth Stoni, kenneth.stoni@socom.mil
Co-Chair: Maj Todd Hamill, hamillj@stratcom.mil
Advisor: Mary Horejs, mahorej@nsa.gov

Analyzing the Effect of Information Attack on Air & Missile Defense Performance, Mr. Bart Paulhamus, Ms. Amy K Castner
Critical Capability Analysis for Information Operations, Mr. Charles Chellis, Mr. Christopher Voxakis, Mr. William Ridings, Dr. Christopher Degni
Applications of Adversary Modeling to Information Operations (IO) and Cyber Operations, Mr. Michael Kretzer, USAF, Dr. Janos Sztipanovits, Dr. Alexander H Levis
A Cross Disciplinary Approach to Planning of Psychological Operations, Mr. Lothar W Deil, USAF, 1st. Lt Ryan Hemperly, USAF
Constructing an Information Operations Analytical Tool, Dr. Brian Efird, Dr. Philippe Loustaunau, Mr. Brett Marvin, Mr. Mike Williams
Using Cyber Intelligence Preparation of the Environment for Battle Damage Assessment, Mr. Charles S Chellis, Mr. Jeff Markey, Mr. Christopher Degni
Using Cyber Intelligence Preparation of the Environment for Computer Network Defense, Ms. Mary Horejs, Mr. Jeffery Markey, Mr. Galo Medina-Ortiz, Dr. Christopher Degni
Effectiveness of Psychological Influence Calculator (EPIC) Methodology Overview, Mr. Bud Whiteman
Modeling Elements of Modern Warfare, Maj. Michael J Artelli, USAF, Dr. Richard F Deckro, Col. Daniel J Zalewski, USAF, Maj. Sonia E Leach, USAF, Dr. Marcus B Perry
A Draft Methodology for Collateral Effects Estimation, Ms. Heidi S Vecera, Dr. Christopher Degni
Electronic Warfare Integration on the IO Range, Mr. Thomas Curby-Lucier, LTC Scott Bisciotti, USA
Developing Action Plans to Mitigate Cyber Threats, Ms. Heidi S Vecera, Dr. Christopher Degni
The Cyber Threat Assessment Matrix: A Methodology for Prioritizing Cyber Threats, Ms. Mary Horejs, Mr. Jeffery Markey, Mr. Galo Medina-Ortiz, Dr. Christopher Degni
Determining Connectivity in the Advanced Warfighting Simulation(AWARS), Mr. Robert Horton II, USA, Ms. Shaynah Schnelle
Developing and Modeling Rule Sets to Defend Networks, Ms. Heidi S Vecera, Ms. Meghan Callahan
Communicating for Effect: Operationalizing and Analyzing Influence Weapons, Col. Jeffrey J Smith, USAF, Dr. Clayton P Bowen, USAF, Maj. Michealangelo Gallucci, USAF, Mr. James Muccio, USAF
Communications and Infrastructure Model Integration, Ms. Laura A Nolan, Dr. Kevin Wedeward, Ms. Mary A Horejs
Adversary Process Simulation, Mr. Charles S Chellis, Mr. Michael Gabai, Mr. Garrett Carstens
An Agent Based Approach to Modeling the Impact of Social Networks, Economics, and Influence and Persuasion on a Civilian, MAJ Jon Alt, USA, CDR Thorsten Seitz, USN, Maj. Todd Ferris, USAF, Mr. Leroy Jackson
A Case Study in Integrated PMESII Modeling and Simulation, Mr. Nicholas J Pioch, Mr. James Melhuish, Mr. Michael F Cook
Adventures in V&V of CNO Analytic Tools, Ms. Laura A Nolan, Ms. Mary A Horejs
Information Operations Platform, Mr. Alan Peterson, USAF
Prioritizing Analytic Requirements: A Decision-Support Approach, Mr. Charles S Chellis, Ms. Meghan Callahan
Workflow Analysis of a Computer Network Operation, Ms. Mary Horejs, Mr. Jeffery Markey, Dr. Christopher Degni
Indicator Discover: A Study, Ms. Heidi S Vecera, Ms. Meghan Callahan, Mr. Jack Crumrine

Preliminary Agenda for Working Group 9 - Countermeasures
Chair: Mr. Nathanael Mosley, Nathanael.mosley@eglin.af.mil
Co-Chair: Capt Meredithe Jessup, USAF, 36 EWS, meredithe.jessup@eglin.af.mil
Co-Chair: Contr. Max Shook, USAF, 412 EWG, max.shook@hurlburt.af.mil
Co-Chair: Mr. Tuyen Tran, Northrup Grumman, tuyen.tran@ngc.com
Co-Chair: Nate Grauvogel, nathanael.grauvogel@dcma.mil
Co-Chair: Maj. Vaughn Heyer, vaughn.heyer@pentagon.af.mil

Understanding End-to-End RF SAM Simulations with Design of Experiments, Capt. Nathanael L Grauvogel, USAF, Mr. Jeffrey J Cheney
Advanced Missile and Electronic Attack Effectiveness Analysis, Capt. Timothy Booher, USAF
Efficient Design of Experiments Application to Analysis of Notional Obscurant Artillery Round Effectiveness, Dr. Thomas A Donnelly, Dr. Roger Davis, Mr. John Walstrum, Mr. William Rouse
An Extended Area Protective System (EAPS) Baseline Interceptor System Effectiveness Analysis, Mr. Robert H Vasse
Electronic Warfare Integration on the IO Range, Mr. Thomas Curby-Lucier, LTC Scott Bisciotti, USA
Close Air Support C-IED, 1st. Lt Paul Griffith, USAF

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Jam Resistant Coding Without Shared Secrets, Lt. Col. Leemon Baird, USAF, Mr. William L Bahn, Mr. Mike D Collings
Historical Bomber Self Defense Tutorial, Mr. Michael W Garrambone, Mr. Timothy W Ewart, Mr. Chris R Linhardt
Command and Control of the Threat System Management Office's Threat Force, Mr. Robert Harvell, USA, Mr. Gary Fowler, Mr. Duard Stephen Woffinden, Mr. Emanuel M Tornquist III
Measuring Progress and Performance from EWIRDB to NGES, Ms. Melanie B Selman
Network Centric Warfare Battle Command Multi-Fidelity Multi-Resolution Modeling and Simulation with MATREX, Mr. Sidney N Antommarchi

Preliminary Agenda for Working Group 10 - Operational Contributions of Space Systems
Chair: Ms. Lynda Liptak, lynda.liptak@ara.com
Co-Chair: Mr. Mike Tomlinson, SAIC, tomlinsonw@saic.com
Co-Chair: Elan Smith, Elan.Smith@wpafb.af.mil
Co-Chair: Paul Page, Paul.Page@smdc.army.mil
Co-Chair: Monica Montoya, Monica.Montoya@kirtland.af.mil
Co-Chair: Lee Lehmkuhl, leel@mitre.org
Co-Chair: Joahn Jones, JONESJ@stratcom.mil
Co-Chair: Milt Johnson, Milton.johnson@peterson.af.mil
Co-Chair: Tom Jacobs, thomas.jacobs@wpafb.af.mil
Co-Chair: Phil Harvey, phillip.harvey@lmco.com
Co-Chair: Roberta Ewart, Roberta.Ewart@losangeles.af.mil
Co-Chair: John Diedenhofen, john.w.diedenhofen@lmco.com
Co-Chair: Tom DeLaCruz, tdelacruz@scitor.com
Co-Chair: Mr. Michael Tedeschi, USAF, Air Force Space Command, michael.tedeschi@peterson.af.mil
Advisor: Mark D Reid, mark.reid@mitre.org

A9 Support to the POM, Mr. Milt Johnson, USAF
Dazzzed! Headshot, clarity: Sentinel measures for planning and programming the future of Space, Mr. Mike A Tedeschi, USAF, Mr. Steve J Wichmann, USAF
AFSPC M&S Investment Plan (M&SIP) Process – Successes & Challenges , Mr. Damon Lum, USAF, Mr. David Hollenbach, USAF, Dr. Lee L Leber, USAF
Space Analysis Resource Portal (SARP) and the Authoritative Data (AD) functionality, Ms. Kathy M Gue, USAF, Dr. Lee L Leber, USAF, Ms. Kathie Reece, USAF
In Search of a Better Space Operational Testing Model, Col. Suzanne M Beers, USAF
AFSCN Common Operating Picture (COP) Tool, Mr. Troy Mitchell, USAF, Mr. Byton Hays, Mr. Eric Miller
Geo-Based Optical Space Surveillance (G-BOSS) Concept Military Utility Assessment Overview , Ms. Monica Montoya, USAF, Ms. Lynda Liptak, Mr. Gary Fauss, Mr. Brian Spanbauer, 1st. Lt Judson McCarty, USAF, Capt. Jermaine Sailsman, USAF
G-BOSS MUA: Supporting Engagement Level Analysis and Constructive SEAS Modeling Adaptation, Mr. Brian Spanbauer, Mr. Taylor Mitchell, Mr. Eric Frisco, Mr. Gary Fauss, Ms. Lynda Liptak, Ms. Monica Montoya, USAF
Geo-Based Optical Space Surveillance (G-BOSS) Concept MUA Design of Experiments, Analysis, and Results, Ms. Lynda K Liptak, Ms. Monica L Montoya, USAF, Mr. Gary Fauss, 1st. Lt Judson McCarty, USAF, Mr. Brian Spanbauer, Mr. Taylor Mitchell
Export Controls and the Health of the US Space Industry, Mr. Alan D Dunham
Media Interaction Theory of Warfare, Mr. Michael P Scardera
Parameterizing Activity Time Distributions for Reusable Military Launch Vehicle Regeneration Modeling , Capt. Joseph A Servidio, USAF, Dr. Alan W Johnson, USAF
Optimal Scheduling of Electro-Optical/Infrared Satellite Sensors, Dr. Steve Baker, Dr. Lee Lehmkuhl, Lt. Col. Andy Armacost, USAF
Space Radar Network Analysis , Mr. Paul A Page, Mr. Christopher L Rickard
Assessment of Army's Need for Theater/Direct Down Link (T/DDL) and Dynamic Re-Tasking (DRT), Dr. Steve F Pierce, Mr. William M Tomlinson
(U) Campaign Effects of Degraded SATCOM: the Impact of Thinline MCO-2 Communications Delays, Dr. Steve Baker, Ms. Susan Hanson, Mr. Bob Abramson, Dr. Lee Lehmkuhl
Mixed ISR Constellation Augmentation Strategy, Maj. Dan Jones, USAF, Mr. Todd Sterns
Space Radar Time Critical / Time Dominant Analysis, Mr. Paul A Page, Mr. John G Zierdt
Study of Reusable Military Launch System Ground Turnaround Time Impacts When Configured for Inverted Re-entry, Mr. Thomas H Jacobs
High Capacity Communications Capability (HC3) Analysis of Alternatives, Ms. Cindy Noble, USA, Mr. Bruce Gorski, USA
Space Analysis Resource Portal, Ms. Kathleen Gue, USAF, Mr. Lee Leber, Ms. Kathie Reece

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Preliminary Agenda for Composite Group C - Joint Warfare
Chair: Ms. Cindy Grier, cindy.grier@us.army.mil
Co-Chair: Rochelle Anderson, rochelle.a.anderson@us.army.mil
Advisor: Paul Works,

Panel Discussion: "Report From the Front:" Joint Warfare Analysis from the Combatant Commander's Perspective, Ms. Cindy Grier (Chair CG C), USA, Ms. Rochelle (Co-Chair of CG C) Anderson, USA

Preliminary Agenda for Working Group 11 - Unmanned Systems
Chair: Mr. Roger Burk, Roger.Burk@usma.edu
Co-Chair: Darryl Ahner, darryl.ahner@us.army.mil
Co-Chair: Paul Richmond, paul.w.richmond@erdc.usace.army.mil
Advisor: Russ Gottfried, Russell.Gottfried@lmco.com

Session Theme: UGVs **Measuring the State of the Art in UGV Technology: the 2007 Joint Ground Robotics Urban Reconnaissance Experiment**, Dr. Thomas Anderson, Mr. David Bruemmer, MAJ Manuel Ugarte, USA, Dr. Curtis Nelson
Mission Planning for Building Clearance/Search Teams Complimented with Unmanned Systems, Mr. Alex Baylot, Dr. Roger C Burk, Cadet Tyler H Ho, USA, Cadet David JK Jeffrey, USA, Cadet Clinton D.-Y. Wang, USA, Cadet Chase B Hunter, USA
Decision Framework for Design of a High-Fidelity Synthetic Environment supporting Unmanned Ground Vehicle Development an, Dr. Niki C Goerger, Dr. Joyce A Nagle, Ms. Victoria D Moore
Session Theme: TRADOC UAS Modeling **Operationalizing Unmanned Aerial System (UAS) for Modeling and Simulation and Analysis**, LTC Kaye McKinzie, USA, Ms. Kelaine Nick, USA, MAJ Laura Byrd, USA, Mr. Benjamin A Anderson, USA
Modeling Analysis Work Group (MAWG) for Unmanned Aerial Systems (UAS), COL Robert Steele, USA, Dr. Patrick Paradis, USA, LTC Kaye McKinzie, USA
Session Theme: Cooperating Unmanned Vehicles **A Platform for Developing Cooperative UAV/UGV Algorithms**, Mr. Rich Primerano, Mr. David Dorsey
Multicast of Critical Information in a Mobile Ad-Hoc Network Using Swarm Intelligence, Mr. David Dorsey, Mr. Chris Gaughan
Unmanned Aerial Systems with Self Organizing Behaviors, MAJ Edward Teague, USA
Documenting Unmanned Aerial System (UAS) Tactics, Techniques and Procedures (TTPs), MAJ John J Herrman, USA, CPT John Sewart, USA
Session Theme: UAS TTPs **Military Utility of Control of the Sky Warrior UAS from an Apache Cockpit**, Dr. Roger C Burk, USA, 2LT David Bounds, USA, 2LT Erik Hamilton, USA, 2LT T. J McHugh, USA, 2LT Brian Miraglia, USA, 2LT Jason Park, USA
Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment, Mr. Eric S Harclerode, USA, Mr. Stephen L Colegrove, USA
Session Theme: Sea Services **N-UCAS Modeling, Simulation, and Analysis Overivew**, Mr. Ken A Amster
Overarching Unmanned Aircraft Systems Study, Mr. David Gibbons, USMC
U.S. COAST GUARD UNMANNED WIDE AREA SURVEILLANCE, LT Lee L Stenson, USCG, LT Anthony Hawes, USCG
Session Theme: Airspace Command and Control **Collision Avoidance Sensor Trade Study (CASTS)**, Mr. Chris R Linhardt, Mr. Richard Graeff, Mr. Paul R Sheridan
Finite State Machines for Creating, Evaluating, and Refining Air-to-Air Combat Tactics, Mr. Jay Moore, Mr. Michael Pekala, Mr. Russell Turner
Unmanned Systems Efforts at US Army Aviation & Missile Research, Development, & Engineering Center, Mr. Larry J Levitt, USA
Joint Airspace Command and Control in Defense Planning Scenarios, Mr. Donald W Hinton, USA
Session Theme: IEDs **Optimized Routing of Unmanned Aerial Systems for the Interdiction of Improvised Explosive Devices**, Maj Daniel N Reber, USMC, Dr. Johannes O Royset
A Constraint Management Approach to Counter-IED Technology Deployment, Mr. Leo H Jones
System of System Effectiveness Analysis and Visualization, Mr. David Flanigan

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Preliminary Agenda for Working Group 12 - Land and Expeditionary Warfare
Chair: Mr. Randall Clements, TRADOC Analysis Center, randall.clements@us.army.mil
Co-Chair: Ms. Jolene Mathis, TRADOC Analysis Center, Jolene.Hostetter@us.army.mil
Co-Chair: Ms. Shaynah Schnelle, TRADOC Analysis Center, Shaynah.Schnelle@us.army.mil
Co-Chair: Mr. Michael Schroeder , Lockheed Martin Center for Innovation, michael.schroeder@lmco.com
Advisor: Ms. Cindy Grier, Headquarters, Department of the Army, Cindy.Grier@us.army.mil

OIF/OEF Current Operations Reachback Support, LTC Kirk Benson, USA, LTC Jeffrey Libby, USA
User Interactive Tool to Assess AGRI II Moving Target ATR Performance, Mr. Albert Ezekiel, Dr. Sami S Ashour
Identifying Socio-Cultural Spatial Signatures for Command-Wire IED Threats, Mr. Jeffrey Burkhalter, USA, Mr. Samuel Hunter, USA, Dr. Dawn Morrison, USA
Campaign Analysis – Improving the Representation of the Joint Fight, Mr. Jim McMullin, USA
Detailed to Aggregated: Providing Key Data to a Campaign Level Study, Mr. Charles D Burdick, Mr. David R Holdsworth, LTC John Crino
A tool for the Analysis of the Army's Future Aviation and Ground Combat Systems, Mr. Scott R Swinsick, Mr. Rupert L Seals
Session Theme: IED's **The Impact of Route Clearance Teams on Coalition Force Operations**, Mr. Clarence K Haubner, USA
DoDAF Models of the IED Threat, Dr. Ronald J Leach, Dr. Kathryn B Laskey, Dr. Harry N Keeling
Modeling IEDs in COMBATXXI, Mr. Jeffrey O Johnson, USA
PEO Soldier Simulation Road Map V, LTC Robert H Kewley, USA
Exploratory Analysis – Using All the Tools in Our Kitbag, Dr. Robert S Alexander, Mr. Michael E Garrity
Air and Ground Based Non-Lethal High Power Microwave Weapons in Support of Truck Convoys in the Urban Environment, Dr. Sam H Parry, Mr. John C Sachs
Integration of Iraqi and Coalition Reports, Mr. Scott Sanborn, USA, LTC Kirk C Benson, USA, Mr. Kyle Minor, USA, Mr. John Warren, USA
Detecting Change in Attack Trends in Operation Iraqi Freedom, MAJ John C Jackson, USA, MAJ Richard Bell, USA
Benefits of Steeper Angle of Fall for Precision Projectiles, Mr. Jon E Peoble, Mr. Jim M Rodrigue
Developing Unclassified Scenarios to Support Test and Experimentation, MAJ Christopher J Emond, USA, MAJ Matt Koehler, USA
Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White
Recent Use of DES in Naval Technology, Platform, Force Architecture, and CONOPS Evaluation Methodologies, Mr. Gregory J Opas, Mr. Timothy A Barnard, Mr. Scott C Henry, Mr. Jonathan G Slutsky
Using an Irregular Warfare (IW) Wargame to Frame a Pythagoras Scenario and Issues, LT Robin Marling, USN, Mr. Richard Clinger, USMC, Ms. Patricia Rossmaier, USMC, Dr. Bob Sheldon, Mr. Edmund J Bitinas
Ithaca: An Unclassified Scenario Suitable for International Use, Mr. Daniel Loibl
Operational ORSA Training Course , LTC Kirk C Benson, USA, LTC Jeffrey Libby, USA, Mr. John Zauner

Preliminary Agenda for Working Group 13 - Littoral Warfare and Regional Sea Control
Chair: Mr. Tom Butherus, thomas.butherus@navy.mil
Co-Chair: Adam Martin, martinar@mccdc.usmc.mil
Co-Chair: Gary Williams, gary.e.williams@lmco.com
Advisor: Nelky Rodriguez, nelky.rodriguezcasan@navy.mil

Counter-SOF Study , LCDR John Nguyen, USN, Mr. Thomas Bothwell
Analyses at NPS in Support of Littoral Operations, CAPT Wayne Hughes, USN
Determining the Optimal Number of LCS Mission Packages , CDR Keith D Kowalski, USN
Kill Chain Analysis for Naval Special Warfare (NSW) Weapons, Platforms, and Sensors, Dr. Chris Hase
LP Modeling of National Fleet Maritime Security Operations Mission Space, Ms. Jennifer J Davis, Ms. Debbie L Clark, Dr. Jennifer Foil
Calibrating Hits-per-Kill in ITEM: It's Harder Than It Looks, Mr. Michael L McCurdy
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton
Requirements-Driven Submarine Design for Littoral Warfare, Mr. Thomas E Wood, Mr. Todd Sedler
Surface Ship ASW Prosecution and Attack, Mr. David W Cann, USN
Analysis of field design considerations for the operation of undersea sensor networks, Dr. Thomas A Wettergren, Mr. Russell Costa
LCS Sea Frame and SUW Mission Package - Weapons Effectiveness Study, Mr. Richard C Rigazio, USN
Recent Use of DES in Naval Technology, Platform, Force Architecture, and CONOPS Evaluation Methodologies, Mr. Gregory J Opas, Mr. Timothy A Barnard, Mr. Scott C Henry, Mr. Jonathan G Slutsky
Volume Fires, LtCol Stanley W Salamon, USMC

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System of System Effectiveness Analysis and Visualization, Mr. David Flanigan
Benefits of Directed Energy Systems for Combat of Asymmetric Threats in Littoral and Maritime Settings, Mrs. Kami K Burr
Joint High Speed Vessel (JHSV) Force Structure and Basing Options Study, LCDR Jason Bridges, USN
A Curvature-Constrained Motion Planning Algorithm for Mine Avoidance, Mr. Fred R Vecera, III
Few-Sweeper Models of Naval Minesweeping with Casualty Replacement Gaps, Mr. Michael L McCurdy
An Analysis of Engagement Coordination Schemes for Integrated Fire Control, Mr. Christopher B Foley, Mr. Bart Paulhamus
Large Medium Speed Roll-on/Roll-off (LMSR) to Mobile Landing Platform (MLP) Assembly Simulation (LMMA), Ms. Jane A Burkett, USN, Mr. Tyson C Kackley, USN
Mobile Landing Platform (MLP) Landing Craft, Air Cushioned (LCAC) Loading Analytic Simulation (MLLAS), Ms. Kimberly D Tuttle, USN, Mr. Tyson C Kackley, USN
Maritime Prepositioning Force (Future) (MPF(F)) Interfaced Model Set (IMS), Mr. Tyson C Kackley, USN

Preliminary Agenda for Working Group 14 - Strike Warfare and Power Projection
Chair: Jim Dettbarn, Lockheed Martin Corportation, jim.dettbarn@lmco.com
Co-Chair: Dave Flanigan, JHU/APL, David.Flanigan@jhuapl.edu
Co-Chair: Tim Sullivan, Lockheed Martin Corportation, timothy.j.sullivan@lmco.com
Co-Chair: Tom Woods, US STRATCOM, WOODST@stratcom.mil
Co-Chair: Amy Howell, Lockheed Martin Corportation, amy.e.howell@lmco.com
Co-Chair: David Szostowski, Lockheed Martin Corportation, david.j.szostowski@lmco.com
Advisor: Scott Simpkins, JHU/APL, scott.simpkins@jhuapl.edu

Optimal Aimpoints in the Presence of Target Location Error, Dr. Don A Grundel, USAF
System of System Effectiveness Analysis and Visualization, Mr. David Flanigan
Global Access and Infrastructure Assessment, Maj. Chad Erspamer, USAF
N-UCAS Modeling, Simulation, and Analysis Overivew, Mr. Ken A Amster
Dealing with 90th Percentiles as a Measure of Error, Mr. Houston A Sewell, USAF
Kill Chain Analysis for Naval Special Warfare (NSW) Weapons, Platforms, and Sensors, Dr. Chris Hase
Testing the Improved Maverick Using Experimental Design, Mr. Matthew Kowalski, USAF, 1st. Lt Aaron Drenth, USAF
Global Strike Tasking Order (GSTO), Mr. Thomas Woods, USAF
Volume Fires, LtCol Stanley W Salamon, USMC
User Interactive Tool to Assess AGRI II Moving Target ATR Performance, Mr. Albert Ezekiel, Dr. Sami S Ashour
Increasing Aircraft Carrier Forward Presence, Mr. James G Kallimani, Mr. Roland J Yardley, Mr. John F Schank, Dr. Clifford Grammich
Joint High Speed Vessel (JHSV) Force Structure and Basing Options Study, LCDR Jason Bridges, USN
OHIO Class Guided Missile Submarine (SSGN): A Transformation in Strike Warfare, Dr. William J Browning, Mr. James H Patton, Jr.
Submarine Air Asset Maritime Interdiction Integration, Mr. Joseph A Root, Mr. Tony Snodgrass

Preliminary Agenda for Working Group 15 - Air Warfare
Chair: Dr. Branford McAllister, Branford.McAllister@eglin.af.mil
Co-Chair: Jeff Dubois, Jeffrey.Dubois@WPAFB.AF.MIL
Co-Chair: Michael Goodman, Michael.Goodman@gdc4s.com
Co-Chair: Chuck Sadowski, charles.sadowski.ctr@langley.af.mil
Co-Chair: Ken Mellin, ken_mellin@sparta.com
Co-Chair: Paul Sheridan, psheridan@caci.com
Advisor: Chris Linhart, Chris.Linhardt@WPAFB.AF.MIL

Excursions to the MCO-2 Long Range Analytical Baseline, Mr. Preston Dunlap, OSD
Campaign Analysis: a Comparison of STORM and THUNDER in MCO-2, Mr. Ted K Broyhill, OSD
Operational Assessment and Operations Tempo, Lt. Col. Kirsten Messer, USAF
Commander Air Force Forces (COMAFFOR) Assessment, Lt. Col. David R Denhard, USAF, Lt. Col. Richard Bullock, USAF
Analysis of a Tactical Course of Action Given a Postulated Threat Against a US Air Force Base, Maj. Gilbert D Ness, USAF
A Hybrid Composite Classification System operating on HRR Signatures Derived from SAR images of ground targets, Capt. Michael A Turnbaugh, USAF, Dr. Kenneth W Bauer
Probability of Opportunity for a Hunter Killer UAS, Mr. Jason Bowman, USAF, Mr. Jeffrey Dubois
Advanced Missile and Electronic Attack Effectiveness Analysis, Capt. Timothy Booher, USAF
Finite State Machines for Creating, Evaluating, and Refining Air-to-Air Combat Tactics, Mr. Jay Moore, Mr. Russell Turner, Mr. Michael

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Pekala
Blue SLAACM: a Stochastic Lanchester Air-to-Air Campaign Model for Blue Attack, Mr. Jeremy M Eckhause, Mr. Robert V Hemm, Dr. David A Lee
Dealing with 90th Percentiles as a Measure of Error, Mr. Houston A Sewell, USAF
Testing the Improved Maverick Using Experimental Design, Mr. Matthew Kowalski, USAF, 1st. Lt Aaron Drenth, USAF
Joint Munitions Effectiveness Manuals Weaponeering System 2.0 – JWS 2.0, Ms. Jessica Stalnaker, USAF, Ms. Cameron McAllister, USAF, Mr. Greg Wilder, USAF
Measuring Progress and Performance from EWIRDB to NGES, Ms. Melanie B Selman
IAVSD Shot Assessment - A First Look, Ms. Janet E Williamson, Mr. Timothy W Ewart, USAF, Mr. David P Whalen, Mr. Chris R Linhardt
Close Air Support C-IED, 1st. Lt Paul A Griffith, USAF
Collision Avoidance Sensor Trade Study (CASTS), Mr. Chris R Linhardt, Mr. Richard Graeff, Mr. Paul R Sheridan
Can you hear me now? F-15E Enhanced Radio Test using DOE , Mrs. Cindy G Zessin, USAF, Mr. Michael H Oelrich, USAF

Preliminary Agenda for Working Group 16 - Special Operations and Irregular Warfare
Chair: Ms. Renee Carlucci, renee.carlucci@us.army.mil
Co-Chair: Darrall Henderson, Darrall.Henderson@us.army.mil
Co-Chair: Bruce Simpson, simpsob@socom.mil
Co-Chair: LTC Paul (Lee) Ewing, paul.ewing@us.army.mil
Co-Chair: Bill Krondak, William.Krondak@us.army.mil
Co-Chair: Dean S Hartley III, DSHartley3@comcast.net
Co-Chair: Herman Orgeron, Herman.Orgeron@us.army.mil
Co-Chair: Mr. Preston Dunlap, OSD/PA&E Simulation and Analysis Center, Preston.Dunlap@osd.mil
Advisor: LTC Clark Heidelbaugh, Army, JCS J7/JETCD , Clark.Heidelbaugh@js.pentagon.mil

Operations Research and the Defeat of IEDs, Mr. Kenneth Comer
Weapons Cache Characterization, Mr. Donald W Amann
Analyzing Weapons Cache Finds in Iraq in Order to Improve Weapons Cache Search and Targeting Strategies, Capt Earl Richardson, USMC, Capt Joseph Mlakar, USMC, Capt Tom Tsoutis, USMC, Mr. Douglas Hoffman
Applying Crime Mapping and Analysis Techniques to Forecast Insurgent Attacks in Iraq, Capt Joseph Mlakar, USMC, Maj Paul Schneider, USMC, MAJ Andy Farnsler, USA, Mr. Douglas Hoffman, USMC
War Gaming Analysis for the Counter-Insurgency , LTC Loren Eggen, LTC Michael Corson, LTC Jeffrey Libby, USA, LTC Carlos Lizardi,
Resourcing the Global War on Terror, LTC Eugene Yancey, USA
Counter-SOF Study , LCDR John Nguyen, USN, Mr. Thomas Bothwell
Detailed to Aggregated: Providing Key Data to a Campaign Level Study, Mr. Charles D Burdick, Mr. David R Holdsworth, LTC John Crino
SOF Operational Planning Tool: a Simulation Approach, Mr. John M Byrnes, USAF
Stability Operations Army Strategic Theater-Level Workshops, Mr. Greg Andreozzi, USA
Security, Stability, Transition and Reconstruction Capacity Gap Analysis , Mr. Duane T Schilling
Stability Operations Gap Analysis, MAJ Matthew D Koehler, USA, MAJ Jay Persons, USA, Mr. William J Krondak, USA
Developing Scenarios and Wargames for Irregular Warfare, MAJ Thomas Glover, USA, Mr. Klaus Sanford, USA
USMC Irregular Warfare (IW) Study – Colombia Scenario, LT Robin Marling, USN, Mr. Richard Clinger, USMC, Ms. Patricia Rossmaier, USMC, Mr. Cortez (Steve) Stephens, USMC, Dr. Bob Sheldon
A Survey of Agent-Based Modeling Tools for Irregular Warfare, Mr. James A Thomas, USN
An Agent Based Approach to Modeling the Impact of Social Networks, Economics, and Influence and Persuasion on a Civilian, MAJ Jon Alt, USA, CDR Thorsten Seitz, USN, Maj. Todd Ferris, USAF, Mr. Leroy Jackson
Forecast and Analysis of Complex Threats, Mr. Thomas Spoon, USA
A Historical Database of Factors of Irregular Warfare, Ms. Justine Blaho, USA, Dr. Seth Howell, USA
MORS Irregular Warfare Workshop, "Improving Cooperation Among Nations in Irregular Warfare Analysis", Dr. Al Sweetser, OSD, Dr. Karsten Engelmann, USA
Employing Open Source Text Analysis for Extraction of Operationally Relevant, Spatially Referenced Socio-Cultural Data, Dr. Lucy A Whalley, USA, Mr. William D Meyer, USA, Mr. Timothy K Perkins, USA
Dangerous Liaisons? Past Affairs Between DoD and Social Science During Times of Insurgency, Dr. Yuna Wong, OSD
Analysis of Influence Operations using EPIC, Mr. Bud Whiteman
Visualization of Selected Data in Stability Operations, Dr. Patrick D Allen
The Impact of Route Clearance Teams on Coalition Force Operations, Mr. Clarence K Haubner, USA
IED ATTACKS, CONFLICT ENTERPRISE, AND SUSTAINED CONFLICT, Dr. Milt Pappas, LTC Robert D McKenzie, USA, Dr. Craig A

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Schultz
Determining the Most Influential Factors to the Severity of Casualties in Iraq Using Data From Personnel Casualty Report, Capt Chris Cannon, USMC, Capt Joseph Mlakar, USMC, Mr. Douglas Hoffman
Historical Analysis of Lesser Contingency Operations, Ms. Trudy A Ferguson, USA
Modifying Features in the Environment for Manipulating Enemy Behavior, Mr. Ben Holland
Alternative Analysis Formulations for Wicked Problems, Mr. James L Hillman
Nexus: An Interpretive Social Simulation applied to the Political Economy of Rent Seeking States, Dr. Deborah V Duong
Irregular Warfare Modeling: A Survey of Agent-Based Modeling Tools, Mr. James A Thomas, USN, Mr. Scott Soderlund, USN
Overview of Analysis of Irregular Warfare Scenario, Mr. Mike Ottenberg, OSD

Preliminary Agenda for Working Group 17 - Joint Campaign Analysis
Chair: Mr. Eric Johnson, richard.e.johnson@unisys.com
Co-Chair: LTC John R Crino, john.crino@osd.mil
Co-Chair: Paul J Bross, paul.bross@lmco.com
Co-Chair: Michael A Ottenberg, michael.ottenberg.ctr@osd.mil
Co-Chair: Dr. James Treharne, USA, CAA, james.treharne@us.army.mil
Advisor: Kenneth Wagner, kenneth.wagner@jfcom.mil

Assessing Progress in Afghanistan, MAJ ALLISON L STEWART, USA
Use of Surveys in the Counter-Insurgency Fight in Afghanistan, MAJ John Michaud, USA
Modeling Army Force Generation: Army Parallel Force Sufficiency Analysis for Operational Availability 2008, Dr. Joshua Klimas, USA
Insights from Operational Availability 2008, Dr. Christopher M Hill, JCS
Conventional Combat - 2 (Long Range) Study, LTC John Crino, USA, Ms. Susan Hanson, Mr. Keith McCready, Ms. Angela Hunter, Mr. Michael Poumade, Mr. Chuck Burdick
Counter-SOF Study , LCDR John Nguyen, USN, Mr. Thomas Bothwell
Overview of Analysis of Irregular Warfare Scenario, Mr. Mike Ottenberg, OSD
Analytic Transparency – Improving Visibility, Transparency, and Accessibility for the DoD Analysis Community, Mr. Gray Gildner, OSD, Mr. Scott Ross, OSD
Excursions to the MCO-2 Long Range Analytical Baseline, Mr. Preston Dunlap, OSD
An Analytic Excursion to Current Year Analytic Baseline, Mr. Arnie Warshawsky
Modeling the MCO-1 Campaign, LCDR Cory Culver, USN
Military Campaign Analysis Support to a National Intelligence Estimate, Mr. Jeffrey A Paulus, OSD
Operational Assessment and Operations Tempo, Lt. Col. Kirsten Messer, USAF
Modeling & Simulation Community of Interest, Mr. Jesse Citizen, OSD, Mr. Terence Peterson, OSD
Modeling and Simulation (M&S) Management, Dr. James G Stevens, OSD, Mr. Billy Sentlinger, OSD
War Gaming Analysis for the Counter-Insurgency , LTC Loren Eggen, USA, LTC Michael Corson, USA, LTC Jeffrey Libby, USA, LTC Carlos Lizardi, USA
Campaign Analysis – Improving the Representation of the Joint Fight, Mr. Jim McMullin, USA
Evaluating Non-Combatant Evacuation Alternatives Using Optimization, MAJ Steve Sparling, USA, Dr. Rob Dell
Joint Force Mix Analysis in OSD (PA&E), Mr. John R Duke, Lt. Col. Tim Smetek, USAF, Mr. Erik Adams
DoD Analytic Agenda Products and Their Use in Strategic Analyses, Dr. James G Stevens, OSD, Mr. Roy Reiss, OSD
DoD Analytic Agenda and JDS, Lt. Col. Michael "Kent" Taylor, USAF
A Red Anti-ship Missile Kill Chain , LCDR John E Ethridge, USN
Quantifying Campaign Effectiveness & Cost: Full-Factorial Design of Experiments Investment Analysis Tool, Mr. Patrick Prostko, USN, Mr. Josh Sorkin, USN
STORM: Improved Capabilities & Maritime Integration, Mr. Michael McMillie, USAF, LCDR Jeffrey Debrine, USN
DoD Modeling & Simulation (M&S) Catalog , Mr. Gray Gildner, OSD, Mr. Stephen Hunt, OSD
Worst Case in WESTPAC, Mr. John D Sullivan, Mr. Richard P Morris, Mr. Michael R Horn
Chief of Naval Operations - World Class Modeling Initiative - FY08 Status and Update, Mr. Joseph V Vignali, USN, Dr Jerry Smith, USN

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Preliminary Agenda for Composite Group D - Resources/Readiness/Training

Chair: Mr. Norm Reitter, reittern@ctc.com
Co-Chair: Touggy Orgeron, Center for Army Analysis,
Co-Chair: John J Kearley, Dynamics Research Corporation, jkearley@drc.com

Panel Discussion of Current Force RESET Issues Facing our Military Today and in the Future, Mr. Norman Reitter, Maj Matt Reuter, USMC, Mr. Joe Mata, COL Dan Williams, USA

Preliminary Agenda for Working Group 18 - Strategic Deployment and Distribution

Chair: Dr. James Moore, James.moore@afit.edu
Co-Chair: Jean Mahan, jean.mahan.ctr@ustranscom.mil
Co-Chair: Karyl Reckamp, karyl.reckamp@ustranscom.mil
Co-Chair: Alan Johnson, alan.johnson@afit.edu
Co-Chair: Pamela Roberts, pamela.roberts@usmc.mil
Co-Chair: Thomas Burwell, thomas.m.burwell@@lmco.com
Co-Chair: Trevor Laine, Trevor.Laine-02@scott.af.mil
Advisor: David Frye, david.c.frye@lmco.com

Mobility Capability and Requirements Study 2008 (MCRS-08), LCDR Phillip E Pournelle, USN, LTC Mark Lukens, USA
Mobility Capbilities and Requirements Study, Ms. Karyl M Reckamp
Global Access and Infrastructure Assessment, Maj. Chad Erspamer, USAF
Expanding Mobility Global Reach, Ms. Diane B Allen
CENTCOM Theater Express -- Next, Lt. Col. Jean M Mahan, USAF
CENTCOM Airlift Network Analysis Using Supply Chain Guru™, Dr. Greg Grindey
Using Measures and Data Within a New Planning Process for Resource Apportionment, Dr. Joe DiRenzo III, USCG, LT Fred Bertsch, USCG
The Node Management & Deployable Depot (NoMaDD) ACTD, Mr. David C Winyard
Nodal Model integration with ELIST and evaluation of NoMaDD, Dr. Charles N Van Groningen, Mr. Steve Sommer
Transforming the Army Rapid Fielding Initiative, MAJ Scott T Crino, USA
DEVELOPING AN EXCEL DECISION SUPPORT SYSTEM USING IN-TRANSIT VISIBILITY TO DECREASE DoD TRANSPORTATION DELAYS, Capt. Brian B Stone, USAF, Mr. James T Moore, USAF, Lt Col Pamela S Donovan, USAF
End to End Distribution and Warfight Modeling, Ms. Andrea Drabek, Ms. Holynne Steppe
Recapitalization of Strategic Sealift and Maritime Preposition Force Analysis, CAPT James T Stewart, USN
Simulation Modeling of CONUS Ammunition Logistics, Mr. Dave Gvozdic
Historical Analysis of Lesser Contingency Operations, Ms. Trudy A Ferguson, USA
Army Operational Employment Database, Ms. Trudy A Ferguson, USA
A War Reserve Resource Prioritization Methology, Dr. Kenneth Girardini, Dr. Carol Fan
Global Force Management Data Initiative, LTC Ilean K Keltz, USA, Mr. George G Sprung, JCS, Dr. James G Stevens , OSD
Adaptive Planning – Linkages with the Analysis Community, COL Paul Martin, USA, Col. Julian H Tolbert, USAF, Lt. Col. Michael "Kent" Taylor, USAF, Mr. Randy Wimmer, OSD
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton

Preliminary Agenda for Working Group 19 - Logistics, Reliability, and Maintainability

Chair: Ms. Jamie Baer, baerj@genco.com
Co-Chair: Tovey Bachman, LMI, tbachman@lmi.org
Co-Chair: Matthew Aylward, Matthew.aylward.ctr@usmc.mil
Advisor: Sheilah Simberg, sheilah.simberg@us.army.mil

Economic Retention of Parts With Sporadic Demand, Mr. Joel Lepak, Dr. Tovey C Bachman
Modeling Leadtime Demand for Frequently-Demanded DLA Parts , Mr. John Westbrook, Ms. Golnar Vaziri, Dr. Tovey Bachman
Simulation Modeling of CONUS Ammunition Logistics, Mr. Dave Gvozdic
Dewdrop Regression, Dr. Thomas W Gage, USAF
An Analysis of Cost vs. Reliability Growth, Mr. Martin R Wayne, USA, Dr. Paul M Ellner, USA
Considering the use of percentiles and confidence when finding resource levels which meet performance requirements, Mr. Joel

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Luna
A War Reserve Resource Prioritization Methology, Dr. Kenneth Girardini, Dr. Carol Fan
Condition Based Maintenance, Mr. Eric Rabeno
Mobility Capability and Requirements Study 2008 (MCRS-08), LCDR Phillip E Pournelle, USN, LTC Mark Lukens, USA
Band 2E/4L Transmitter Reliability Analysis, Dr. Peter J Francis
Reliability Analysis & Modeling of the USMC Med. Tactical Wheeled Vehicle in OIF, Maj Matthew B Reuter, USMC
Genetic Algorithm Cross-Leveling Equipment Heuristic , Mr. Jake Enholm
Implementing ARFORGEN: Installation Capability and Feasibility Study of Meeting ARFORGEN Unit Reset Guidelines, Dr. Steven P Wilcox, BG Dorian Anderson, USA (Ret), Ms. Pamela Blackmon, Mr. Paul Coviello, Mr. Brendan Curvey, Mr. Hal Hogan
US Army Equipment Sourcing Decisions for ARFORGEN RESET, Mr. Norman Reitter, Mr. Don Bates, USA
Right-sizing The Logistics Deployment Footprint To Meet Required Metrics, Mr. Thomas T Collipi, Mr. Michael H Albright
Measuring Availability Beyond 'Mission Capable Rate', Dr. Roy E Rice
Modeling the Effects of Maintenance Capabilities on Aircraft Operations, Maj. Jennifer G Walston, USAF, Maj. Anthony F Antoline, USAF, Capt. Scotty A Pendley, USAF, 1st. Lt Frank A Lubelt, USAF
Analysis of Sortie and Mission Capable Rates as a Function of Aircrews and Maintenance, Mr. George Crowder, USAF
Sustainment Battle Command Research Program, Mr. Michael F Byrd, USA, Mr. Morris Hayes, USA
Implementing Sustainment Battle Command (SBC) in the Advanced Warfighting Simulation (AWARS), Ms. Bonnie J McIlrath, USA
Analyzing Sustainment Battle Command Enablers via Layered Networks in Discrete Event Simulations, LTC Rich Spainhour, USA, Mr. Leroy Jackson
Implications Of Material Availability and Ownwership Cost As A Key Performance Parameter and Key System Attribute , Mr. Thomas T Collipi, Mr. Michael H Albright
Using Monte Carlo Simulations to Evaluate Unmanned Aircraft Systems Reliability Requirements, Mr. David Gibbons, USMC
Modeling Reset Strategies for Airframes Post-Deployment, Mr. Reginald L Goodwin
Army Reserve Accession and Retention Analysis, Mr. Alan R Cunningham, USA, MAJ Portia J Benson, USA, Ms. Amy R McGrath, USA, Ms. Maura Keller
Actively Managing Air Fleet Lifetimes, Maj. Michael Staples, USAF, Dr. Edward Robbins, USAF
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton
Recent Use of DES in Naval Technology, Platform, Force Architecture, and CONOPS Evaluation Methodologies, Mr. Gregory J Opas, Mr. Timothy A Barnard, Mr. Scott C Henry, Mr. Jonathan G Slutsky
Prognostics and Health Management (PHM) capability in the Logistics Composite Model (LCOM), Mr. Joel Luna

Preliminary Agenda for Working Group 20 - Manpower and Personnel
Chair: MAJ Mark Gorak, mark.gorak@mepcom.army.mil
Co-Chair: LTC Scott Nestler, Army, USMA Instructor, scott.nestler@usma.edu
Advisor: Rod Roederer, rodney.roederer@usma.edu

An Analysis of Teen's Belief's and Attitudes about Military Service, Mrs. Jennifer L Kelly
Enlisted Bonuses to Extend Contract - How Much is Enought?, Mr. Gary M Ton, USN
Mathematical Perspectives on the Federal Thrift Savings Plan, LTC Scott T Nestler, USA
Implementing ARFORGEN: Installation Capability and Feasibility Study of Meeting ARFORGEN Unit Reset Guidelines, Dr. Steven P Wilcox, BG Dorian Anderson, USA (Ret), Ms. Pamela Blackmon, Mr. Paul Coviello, Mr. Brendan Curvey, Mr. Hal Hogan
CS-CSS Unit Integration into ARFORGEN, Mr. Alan R Cunningham, USA, Mr. Mark P Schairbaum, USA, Mr. Kevin Keaveney
Iraqi Security Force Shaping Model, LTC Kirk C Benson, USA
Modeling the Effects of Maintenance Capabilities on Aircraft Operations, Maj. Jennifer G Walston, USAF, Maj. Anthony F Antoline, USAF, Capt. Scotty A Pendley, USAF, 1st. Lt Frank A Iubelt, USAF
Determining Crew Size via Task Analysis, Ms. Margaret E Beecher, Mr. Michael S Moreno
Credentialing: A Mechanism for Improving Operations Analysis and Operations Research Professional Development, Mr. Robert L Simons, Dr. Michael S McCoy
THE TOTAL ARMY COMPETITIVE CATEGORY OPTIMIZATION MODEL: ANALYSIS OF U.S. ARMY OFFICER ACCESSIONS AND PROMOTIONS, MAJ Hise Gibson, USA
Hurry Up and Wait. . . Optimizing the Initial Skills Training Scheduling Process, 2nd. Lt Anthony A Illig, USAF, Maj. August G Roesener, USAF, Maj. Shane A Knighton, USAF, Maj. Shane N Hall, USAF
Optimizing Applicant Flow at Military Entrance Processing Stations (MEPS), Ms. Rebecca M Porinsky, USA
Fitness Report Objective Ranking Matrix, CDR David Spoerl, USN

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Operational ORSA Training Course , LTC Kirk C Benson, USA, LTC Jeffrey Libby, USA, Mr. John Zauner
Military Transition Team (MiTT) Sourcing Analysis, LTC Vern J Bahm, USA
The effects of reducing the number of constraints on goal-based forecasts in the Army Civilian Forecasting System., Mr. James Walter
Modeling BRAC Effects in the Army Civilian Forecasting System, Mr. Richard Shaffer
Forecasting Officer Commissions for the United States Army Cadet Command (Senior Reserve Officer Training Corps (ROTC)), MAJ Vaughn D DeLong, USA, LTC Paul L Webber, USA
Prior Service Market Research Study , MAJ Brian A Thomas, USA
Army Reserve Accession and Retention Analysis, Mr. Alan R Cunningham, USA, MAJ Portia J Benson, USA, Ms. Amy R McGrath, USA, Ms. Maura Keller
IRR-TPU Affiliation Study, Mr. Alan R Cunningham, USA, MAJ Hans G Barkey, USA, Ms. Amy McGrath, USA
Army Reserve Educational Assistance Study, Mr. Alan R Cunningham, USA, Mr. Drew Cherry, USA, Ms. Amy R McGrath, USA

Preliminary Agenda for Working Group 21 - Readiness
Chair: COL Joe Adams, Joseph.Adams@osd.mil
Co-Chair: Maria K Hughes, maria.hughes@osd.mil
Co-Chair: George Kuhn, gkuhn@lmi.org
Co-Chair: LTC Steve Stoddard, steven.stoddard@osd.mil
Co-Chair: Mike Slay, mslay@lmi.org
Advisor: Joseph J Angello

Sponsor's Keynote Address - Readiness Challenges to the Department of Defense, Mr. Joseph J Angello, Jr, USA
First and Second Order Difficulties in Measuring and Ensuring Readiness, Dr. Seth A Howell, USA
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton
Measuring Availability Beyond 'Mission Capable Rate', Dr. Roy E Rice
Quantifying the Interrelationships and Trade-offs between Capabilities and Plans: DOD's Economy of Risk, Mr. Jonathan R Charlton
Genetic Algorithm Cross-Leveling Equipment Heuristic , Mr. Jake Enholm
Measuring the Impact of a Force Generation Policies on Force Size, LTC Steve Stoddard, USA
Relieving Stress on the Force: Options for the Army, COL Robert B Magruder, USA, Dr. David Graham
CS-CSS Unit Integration into ARFORGEN, Mr. Alan R Cunningham, USA, Mr. Mark P Schairbaum, USA, Mr. Kevin Keaveney
Fleet Material Readiness Assessment, Mr. Carlos F Cruz
US Army Equipment Sourcing Decisions for ARFORGEN RESET, Mr. Norman Reitter, Mr. Don Bates, USA
Using Enterprise Assessments for SORTS Ratings, Dr. David Fulk, Dr. Douglas Blazer, Mr. Robert Kline
Global Force Management Data Initiative, LTC Ilean K Keltz, USA, Mr. George G Sprung, JCS, Dr. James G Stevens , OSD
Adaptive Planning – Linkages with the Analysis Community, COL Paul Martin, USA, Col. Julian H Tolbert, USAF, Lt. Col. Michael "Kent" Taylor, USAF, Mr. Randy Wimmer, OSD
Metrics for Training & Exercises Funding - Capability versus Investments, Ms. Patricia H Rossmaier, USMC, Mr. Richard A Clinger, USMC
Counterinsurgency Wargame Development, Mr. Stuart T Wilkes, USA, MAJ Marvin King, USA, Mr. David C Reynolds, USA, Mr. Daniel Mahoney, USA
IRR-TPU Affiliation Study, Mr. Alan R Cunningham, USA, MAJ Hans G Barkey, USA, Ms. Amy McGrath, USA
Army Reserve Accession and Retention Analysis, Mr. Alan R Cunningham, USA, MAJ Portia J Benson, USA, Ms. Amy R McGrath, USA, Ms. Maura Keller
Iraqi Security Force Shaping Model, LTC Kirk C Benson, USA
Modeling Reset Strategies for Airframes Post-Deployment, Mr. Reginald L Goodwin
CH-53K Systems Design and Development MS&A Support, Mr. Kenneth H Frieder, Mr. John Hargraves, Mr. Michael Beanland, Mrs. Valencia Floyd, USN
Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White
Social Science Foundations for GWOT Analysis, Dr. Yuna Wong, OSD
Band 2E/4L Transmitter Reliability Analysis, Dr. Peter J Francis
Operational ORSA Training Course , LTC Kirk C Benson, USA, LTC Jeffrey Libby, USA, Mr. John Zauner
Implementing ARFORGEN: Installation Capability and Feasibility Study of Meeting ARFORGEN Unit Reset Guidelines, Dr. Steven P Wilcox, BG Dorian Anderson, USA (Ret), Ms. Pamela Blackmon, Mr. Paul Coviello, Mr. Brendan Curvey, Mr. Hal Hogan

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Preliminary Agenda for Working Group 22 - Analytic Support to Training
Chair: Mr. John Kearley, jkearley@drc.com
Co-Chair: Maria Minchew, Dynamics Research Corporation, MMinchew@drc.com
Co-Chair: Col John Sees, SeesJ@ndu.edu
Co-Chair: Dave Baranek, David.Baranek.CTR@osd.mil
Co-Chair: Mark Gerner, mark.gerner@ocar.army.pentagon.mil
Advisor: Bruce Harris, bharris@drc.com

Session Theme: Training Tools and Strategies **Establishing an Analytic Framework for Joint Training Assessment**, Ms. Annie Patenaude, OSD
Joint National Training Capability, CAPT Charles Melcher, USN
Integrating Individual, Small Group, and Collective Training Capabilities within the Joint Learning Continuum Construct, Mr. Alex H Hoover
Training in a Net-Centric Environment, Mr. Fred Hartman
Measuring Training ROI: Silver Bullet or Urban Legend?, Mr. Nickolas P Angelo, USAF
Training Strategies for Newly Designed Army Headquarters , Mr. Mark H Gerner
Use of Conceptual Models in Support of JFIIT Assessments, Mr. Robert J Anderson
Evaluation of Pilot Implementations of the Guided Experiential Learning (GEL) Training Design Approach, Dr. Brenda Wenzel, USA, Dr. Patricia Kinney, USA, Ms. Lounell Southard, USA
Determining the Educational Value to Graduate Students Participating in the International Macroeconomics Exercise, COL John C Sees, USA
Estimating U.S. Army small unit pre-deployment training development requirements, Mr. William R Sanders, USA
CS-CSS Unit Integration into ARFORGEN, Mr. Alan R Cunningham, USA, Mr. Mark P Schairbaum, USA, Mr. Kevin Keaveney
IRR-TPU Affiliation Study, Mr. Alan R Cunningham, USA, MAJ Hans G Barkey, USA, Ms. Amy McGrath, USA
No Presentations assigned for this session
A Report on the Sponsor Focused Colloquium on Operations Research Methods for IED Defeat, 13-15 November 2007, Dr. Steve Riese
Operational Analysis in Support to IED Defeat, MND-N (25th ID), OIF, Jan-Oct 07, MAJ Russell J Schott, USA
Operations Research in the Counter-IED fight., Capt Anastasios Tsoutis, USMC
Operational ORSA Training Course , LTC Kirk C Benson, USA, LTC Jeffrey Libby, USA, Mr. John Zauner
Designing Operational Tools That Foster Advanced Analytic Thinking, Dr. Gerald M Powell, USA
A Methodology for Analyzing Learning Variation, Dr. Sylvia Acchione-Noel, USA
Hurry Up and Wait. . . Optimizing the Initial Skills Training Scheduling Process, 2nd. Lt Anthony A Illig, USAF, Maj. August G Roesener, USAF, Maj. Shane A Knighton, USAF, Maj. Shane N Hall, USAF
Automated Transcription Tool for Tactical Communications Assessment, Mr. David Williamson, USAF, Mr. Timothy Barry, Mr. Robin Snyder, USAF
Value of Embedded Training – Army Future Combat Systems Example., Mr. Kevin H Pilgrim
Sensor Performance Optimization Tool, Mr. James S Richardson

Preliminary Agenda for Working Group 23 - Casualty Estimation and Force Health Protection
Chair: Mr. Pat McMurry, pat.mcmurry@amedd.army.mil
Co-Chair: Johnny Brock, Johnny.Brock@tbe.com
Advisor: Bruce Shahbaz, Bruce.Shahbaz@altarum.org

Overview of Enterprise ESP, the Web-based Estimating Supplies Program, Mr. Joseph Parker, Mr. Gerald Pang
Using Discrete Event Simulation To Support Hospital Bed And Operating Room Hour Requirements Determination, Mr. PAT M MCMURRY, USA
Monte Carlo Estimation of Air Ambulance Requirements , LTC Lawrence Fulton, USA, Mr. Jack Zeto, USA, Mr. Pat McMurry
Using SAS® Stochastic Simulation to Support Development of the Army's Hospital Augmentation Teams Rules of Allocation, Mr. Raymond B Devore, USA, LTC Lawrence V Fulton, USA
Determining the Most Influential Factors to the Severity of Casualties in Iraq Using Data From Personnel Casualty Report, Capt Chris Cannon, USMC, Capt Joseph Mlakar, USMC, Mr. Douglas Hoffman
Hospitalization metrics among USMC deployed in support of OIF and OEF, Mr. James Zouris, Ms. Noelle Gronroos
Statistical Analyses of the Percentages Remunerated in Compensation to Disabled US Army Soldiers, Mr. John F Zeto, USA
Mid-Term Health and Personnel Outcomes of Recent Military Combat Amputees, Mr. George J Walker

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Agent-Based Simulation of IED Blast and Shrapnel Effects, Mr. H. R Blacksten, Ms. Austin Zimmerman, Dr. Brett Steele, Dr. Philip Hammar, Dr. Doug Samuelson
Improvised Explosive Devices in Iraq: Injury Patterns, Severity, and Outcomes, Ms. Amber L Wade, Mr. Michael R Galarneau
Air Mobility Counter IED Effects in OIF, Capt. Stephen O'Leary, USAF, Dr. John Borsi, USAF, Lt. Col. J. D. Hunsicker, USAF
Agent Based Biological and Chemical Mass Casualty Event Modeling, Ms. Janelle L Blazier, Dr. Craig Newborn, Ms. Yen Andrews, Mr. Todd Burwell
The CREATIVE Decontamination Performance Model, Ms. Erin E Shelly, Dr. Brent Mantooth, Dr. Roger Davis, Mr. Joshua Combs
Review and Assessment of Chlorine Mammilian Lethality Data and the Development of a Human Estimate, Mr. Douglas R Sommerville, USA, Ms. Sharon A Reutter-Christy, Ms. Erin E Shelly, Mr. John J Bray, Mr. Raymond E Jablonski
Exploring the WMD Enhancements within the Joint Analysis System (JAS), Mr. Peter B Melim, Mr. Walt Richert
A Methodology for Determining the Size and Configuration of Expeditionary Medical Facilities, Mr. Johnny Brock, Dr. Paula Konoske, Mrs. Sherry Adlich
Removing Human Errors From Human-In-The-Loop Simulation Exercises, Mr. Michael J O'Connor, USA, Mr. Pat M McMurry, USA, Mr. George W Hausler, USA, LTC Lawrence V Fulton, USA
Integrated Logistics Analysis Plan Future Combat Systems Medical Evacuation Study Report for Omni Fusion 2006, Mr. GEORGE W HAUSLER, USA, Mr. Michael J O'Connor, USA, Mr. Ray Devore, USA, Mr. Pat McMurry, USA, LTC Lawrence V Fulton, USA

Preliminary Agenda for Composite Group E - Acquisition
Chair: Dr. Frank Gray, OSD, Frank.Gray@jte.osd.mil
Co-Chair: Greg T Hutto, 46 Test Wing, Gregory.Hutto@eglin.af.mil

Operations Research Analysis in Future Defense Acquisition, Dr. Frank Gray, OSD

Preliminary Agenda for Working Group 24 - Measures of Merit
Chair: Mr. Joe Anderson, Joseph.S.Anderson@us.army.mil
Co-Chair: Claire Mulcare, claire.s.mulcare@us.army.mil
Co-Chair: Ms Donna Cote, donna.m.cote@us.army.mil
Co-Chair: Ms. Bonnie Mc Ilrath, TRADOC Analysis Center, bonnie.j.mcilrath@us.army.mil
Co-Chair: Eric Johnson, eric.e.johnson1@us.army.mil
Advisor: LTC Brad Pippin, bradley.pippin@us.army.mil

High Capacity Communications Capability (HC3) Analysis of Alternatives, Ms. Cindy Noble, USA, Mr. Bruce Gorski, USA
Spectral Methods for Network Analysis, Mr. Daniel Derendinger, USA, Mr. Michael S Cox, USA
IED ATTACKS, CONFLICT ENTERPRISE, AND SUSTAINED CONFLICT, Dr. Milt Pappas, LTC Robert D McKenzie, Dr. Craig A Schultz
Measurement of Situational Awareness in a Dismounted Infantry Platoon, MAJ Jon Alt, USA, Dr. Larry Shattuck, Dr. Nita Miller, Dr. Roger Chapman
Technical Requirements Alignment Matrix - A Tool for Supporting Requirements Traceability and SE Process Development, Mr. Robert K Mock
An Analytic and Functional Decomposition of Battle Command to Enable Cross Command M&S Development, Mr. Brian K Hobson
Social Science Foundations for GWOT Analysis, Dr. Yuna Wong, OSD
Communicating for Effect: Operationalizing and Analyzing Influence Weapons, Col. Jeffrey J Smith, USAF, Dr. Clayton P Bowen, USAF, Maj. Michealangelo Gallucci, USAF, Mr. James Muccio, USAF
Dangerous Liaisons? Past Affairs Between DoD and Social Science During Times of Insurgency, Dr. Yuna Wong, OSD
Measuring the State of the Art in UGV Technology: the 2007 Joint Ground Robotics Urban Reconnaissance Experiment, Dr. Thomas Anderson, Mr. David Bruemmer, MAJ Manuel Ugarte, USA, Dr. Curtis Nelson
Dealing with 90th Percentiles as a Measure of Error, Mr. Houston A Sewell, USAF
LCS Sea Frame and SUW Mission Package - Weapons Effectiveness Study, Mr. Richard C Rigazio, USN
Using Measures and Data Within a New Planning Process for Resource Apportionment, Dr. Joe DiRenzo III, LT Fred Bertsch, USCG
First and Second Order Difficulties in Measuring and Ensuring Readiness, Dr. Seth A Howell, USA
Qualitative Social Science Methods for PMESII Analysis, Dr. Yuna Wong, OSD
Causal Interaction Modeling for IED Defeat, Dr. Kathryn B Laskey, Dr. Tod S Levitt, Dr. Andrew G Loerch, Mr. Ronald F Woodaman
Evaluating Visual Detection of IEDs, Dr. Jennifer S Murphy, Dr. Terry W Stanard, Dr. Grayson Cuqlock-Knopp, Dr. Alan Ashworth, Ms. Kristin M Schweitzer, Dr. Adrienne J Raglin
The Economics of Roadside Bombs, Mr. Matthew Hanson
Air and Ground Based Non-Lethal High Power Microwave Weapons in Support of Truck Convoys in the Urban Environment, Dr. Sam

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H Parry, Mr. John C Sachs
Soft metrics for decision analysis under uncertainty, Dr. Michelle D Quirk
Use of Conceptual Models in Support of JFIIT Assessments, Mr. Robert J Anderson
A Constraint Management Approach to Counter-IED Technology Deployment, Mr. Leo H Jones
Quantifying the Survivability Onion of the Future Combat System Manned Ground Vehicle , MAJ Kenneth W Burkman, LTC Barry Ezell

Preliminary Agenda for Working Group 25 - Test and Evaluation (T&E)
Chair: Mr. R. J Anderson, Robert.Anderson.ctr@eglin.af.mil
Co-Chair: Steve Boothe, Boothes@cotf.navy.mil
Co-Chair: Allan Fehlings, Allan.D.Fehlings@saic.com
Co-Chair: Ari Paez, Aristides.Paez@nellis.af.mil
Co-Chair: Al Davis, Al.Davis2@atec.army.mil
Co-Chair: Peggy Wisdom, Margret.Wisdom@afotec.af.mil
Co-Chair: Lyn Padgett, Lyn.Padgett@usmc.mil
Advisor: Greg Hutto, Gregory.Hutto@eglin.af.mil

Efficient Design of Experiments Application to Analysis of Notional Obscurant Artillery Round Effectiveness, Dr. Thomas A Donnelly, Dr. Roger Davis, Mr. John Walstrum, Mr. William Rouse
Modeling and Simulation to Support Test and Evaluation of Chemical and Biological Defense Systems, Dr. George E Steiger, USA, Dr. Thomas J Stadterman, USA, Mr. Carl M Eissner, USA, Mr. Charles Fromer, OSD, Mr. Eric Lowenstein, OSD
In Search of a Better Space Operational Testing Model, Col. Suzanne M Beers, USAF
Testing the Improved Maverick Using Experimental Design, Mr. Matthew Kowalski, USAF, 1st. Lt Aaron Drenth, USAF
To Protect and to Serve: Joint Collective Protection Test Standards , 1st. Lt Stacy M Baber, USAF
Dealing with 90th Percentiles as a Measure of Error, Mr. Houston A Sewell, USAF
Evaluating Effects: Methods and Processes for Distributed Testing of Limited-Access Programs , Mr. Stafford R Maheu
System of Systems Measurement in Evaluation of Joint Mission Effectiveness, Mr. Mark J Fiebrandt, Mr. John Wilson
Use of Conceptual Models in Support of JFIIT Assessments, Mr. Robert J Anderson
System-of-System Analysis and Experimentation for the Future Force Warrior, Dr. Robert S Alexander, Mr. William F Harris
Developing Unclassified Scenarios to Support Test and Experimentation, MAJ Christopher J Emond, USA, MAJ Matt Koehler, USA
Measurement of Situational Awareness in a Dismounted Infantry Platoon, MAJ Jon Alt, USA, Dr. Larry Shattuck, Dr. Nita Miller, Dr. Roger Chapman
Technical Requirements Alignment Matrix - A Tool for Supporting Requirements Traceability and SE Process Development, Mr. Robert K Mock
Benefits and Uses of a CBRN M&S Capability Integrated into the MATREX, Mr. Chris Gaughan, Mr. Tom Hurt, Mr. Joey Fann, Ms. Lana McGlynn
Can you hear me now? F-15E Enhanced Radio Test using DOE , Mrs. Cindy G Zessin, USAF, Mr. Michael H Oelrich, USAF
Understanding End-to-End RF SAM Simulations with Design of Experiments, Capt. Nathanael L Grauvogel, USAF, Mr. Jeffrey J Cheney
Estimating Performance of a Standoff Biological Detection System Against Actual Biological Warfare Agents, Dr. Kensuke Shirakawa, USA, Mr. Charlie Holman, USA, Dr. Carl T Russel
Information Assurance Test and Evaluation Process: An ATEC Perspective, Mr. Dwayne T Hill, USA, Ms. Melanie Miller, USA
A Modeling and Simulation Approach to Analysis of Stressors on Non-Line of Sight Launch System (NLOS-LS) Control Cell Cr, Mr. Bret Kellihan
OTC Analytic Simulation and Instrumentation Suite (OASIS) Brings Live Players to MATREX, Mr. Jimmie S Smith, USA, Mr. Gary M Smith, Ms. Lana E McGlynn
When Academia Meets Reality: Negotiating an Experimental Design, Mr. Paul J Bross, Ms. Julie Sanchack
Aligning DOD Capabilities-Based Assessment Inputs for Testing in a Joint Environment, Dr. David A Dryer, Mr. Gerald Gendron, OSD
Implementation of Verification and Validation (V&V) Attributes as a Practical Approach, Mr. Joseph Olah
Exploratory Analysis – Using All the Tools in Our Kitbag, Dr. Robert S Alexander, Mr. Michael E Garrity
A tool for the Analysis of the Army's Future Aviation and Ground Combat Systems, Mr. Scott R Swinsick, Mr. Rupert L Seals
The CREATIVE Decontamination Performance Model, Ms. Erin E Shelly, Dr. Brent Mantooth, Dr. Roger Davis, Mr. Joshua Combs
Analysis of the Operational Effect of the Joint Chemical Agent Detector Using the Infantry Warrior Simulation (IWARS), Mr. David B Gillis, USA, Mr. Kevin M Guite, USA, Mr. Carl M Eissner, USA, Dr. George E Steiger, USA, Mr. Charles E Holman, Ms. Lynn A Coles
Simulation Modeling of CONUS Ammunition Logistics, Mr. Dave Gvozdic
Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White

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Preliminary Agenda for Working Group 26 - Analysis of Alternatives (AoAs)
Chair: Annette Baldwin, USAF, Office of Aerospace Studies, annette.baldwin@kirtland.af.mil
Co-Chair: Maj Tony Veerkamp, USAF, tony.veerkamp@kirtland.af.mil
Co-Chair: Chris Chisholm, cchisholm@ssai.org
Co-Chair: Philip Sauer, pssauer@nsa.gov
Advisor: Joe Aulettta, Joseph.Auletta@kirtland.af.mil

Information Sharing Between Industry and Defense Community, Dr. James G Stevens, OSD, Ms. Suzy Majerich, OSD
Quantifying the Interrelationships and Trade-offs between Capabilities and Plans: DOD's Economy of Risk, Mr. Jonathan R Charlton
Analytic Transparency – Improving Visibility, Transparency, and Accessibility for the DoD Analysis Community, Mr. Gray Gildner, OSD, Mr. Scott Ross, OSD
System Functional Analysis in a Capability Mapping Framework, Mrs. Laura J Byrd, Mr. Jason B Shreve
Capabilities Needs Analysis: Decision Analysis for Building the Future Force, Mr. Ronald F Salyer, USA, LTC Sean Deller, USA, MAJ Aaron Swain, USA
System-of-System Analysis and Experimentation for the Future Force Warrior, Dr. Robert S Alexander, Mr. William F Harris
Pre-Milestone-A Cost Estimating: Progress, Challenges, and Change, Ms. Martha "Marti" A Roper, USA
Intelligence Life Cycle Cost Estimating, Mr. Tim Edem, USAF
Hephaestus: Application to Strategic Airlift Force Structure Cost Analysis, Maj. Matthew Durkin, USAF
Determining the Optimal Number of LCS Mission Packages , CDR Keith D Kowalski, USN
Applying ISR Mission Decomposition processes to Analyses of Alternatives (AoAs), Ms. Charita Petrina, USAF, Ms. Brandy Gorham, USAF
An Approach for Analysing BDA Risk in FSAs & AoAs, Dr. Theodore P Lewis, USAF
High Capacity Communications Capability (HC3) Analysis of Alternatives, Ms. Cindy Noble, USA, Mr. Bruce Gorski, USA
An Extended Area Protective System (EAPS) Baseline Interceptor System Effectiveness Analysis, Mr. Robert H Vasse
USCG INTEGRATED DEEPWATER SYSTEM (IDS) ALTERNATIVES ANALYSIS, Mr. Charles M Mitchell, Ms. Kathleen S Kettel, USCG, Mr. Bert N Macesker, USCG
Measuring Training ROI: Silver Bullet or Urban Legend?, Mr. Nickolas P Angelo, USAF
Exploring the Impact of Information on Small Unit Force Effectiveness, CPT Clark C Adams, USA
A Review of the MOE/MOP Literature: A Look at the Past to Help Today, Mr. John M Green
Aligning DOD Capabilities-Based Assessment Inputs for Testing in a Joint Environment, Dr. David A Dryer, Mr. Gerald Gendron, OSD
Integrated Unit, Base, Installation Protection (IUBIP) Capabilities Based Assessment (CBA), Mr. Michael J Martori, Mr. Nash M Howell
Understanding Patterns of Team Collaboration Employed To Solve Unique Problems, Ms. Susan G Hutchins, USN, Mr. Tony Kendall,
Use of Confidence Intervals for Comparing Force Package Capabilities, Mr. James S Richardson
Exploratory Analysis – Using All the Tools in Our Kitbag, Dr. Robert S Alexander, Mr. Michael E Garrity

Preliminary Agenda for Working Group 27 - Cost Analysis
Chair: Mr. Dan D Dassow, The Boeing Company, daniel.d.dassow@boeing.com
Co-Chair: Dr. William Jarvis, Independent Program Assessment Office, NASA Headquarters, wjarvis@hq.nasa.gov
Advisor: Mr. Justin Moul, IT Division, Air Force Cost Analysis Agency, justin.moul@pentagon.af.mil

Session Theme: Fundamentals of Cost Analysis **GAO Cost Assessment Guide - Best Practices for Developing and Managing Program Cost Estimates** , Mrs. Karen A Richey, Ms. Carol Cha
Cost Risk as a Discriminator in Trade Studies, Dr. Stephen A Book
Session Theme: Operating and Support-Basics **Operating and Support (O&S) Trends and Current Issues**, Mr. Walt Cooper, OSD
Introduction to the Operating and Support Cost Analysis Model (OSCAM), Ms. Mary M Mertz, USN, Mr. Geoffrey Pawlowski, USN
Session Theme: Operating and Support-Applied **Metalogistics and the O&S Cost Trade Space**, Mr. Terry J Mitchell
The engineering of information systems: the system failure approach , Dr. Michelle D Quirk
Session Theme: Electronics and Software Costs **Common Component of Aircraft O&M Cost**, Mr. Michael Larkin, USAF
A History of Cost Estimating Techniques Used In the Multifunctional Information Distribution System (MIDS), Mr. Timothy Long, Mr. Kenneth Tsang, Mr. Benjamin Breaux, Mr. Daniel Schluckebier
Predicting Software Costs, Ms. Corinne C Wallshein, USAF
Session Theme: Historical Cost Research

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Analyzing Cost Growth in Government Acquisitions, Mr. Richard G Cline, Mr. Toan B Nguyen, Mr. David W Ross
Improved Methodology to Estimate Reimbursable Costs for Research and Technology, Mr. Roger L Staso, Mr. Mark E Witkowski, USA
Impacts of Inflation on Total Obligation Authority, Lt. Col. Victor Wiley, USAF
Session Theme: Staffing and Fleet Readiness **Patterns of Expenditure: When Should Peak Staffing Occur?**, Dr. William H Jarvis, OSD
Fleet Material Readiness Assessment, Mr. Carlos F Cruz
Session Theme: Trade Studies and Tools **C-130 Center Wing Box (CWB) as a Business Case Study**, Lt. Col. Mark Foringer, USAF
Economics of Speed in Military Applications, Mr. Christian T Host
Intelligence Life Cycle Cost Estimating, Mr. Tim Edem, USAF
Pre-Milestone-A Cost Estimating: Progress, Challenges, and Change, Ms. Martha "Marti" A Roper, USA
Hephaestus: Application to Strategic Airlift Force Structure Cost Analysis, Maj. Matthew Durkin, USAF
Vehicle Health Management System Business Case Analysis, LTC Scott T Nestler, USA
Determining the Optimal Number of LCS Mission Packages , CDR Keith D Kowalski, USN
Army Reserve Accession and Retention Analysis, Mr. Alan R Cunningham, MAJ Portia J Benson, Ms. Amy R McGrath, Ms. Maura Keller
Applying an Analogy-Based Cost Estimating Tool to Identify 'Best-Value' Technologies, Mr. Mark S Schankman, Mr. John W Reynolds
High Capacity Communications Capability (HC3) Analysis of Alternatives, Ms. Cindy Noble, USA, Mr. Bruce Gorski, USA
Army Reserve Educational Assistance Study, Mr. Alan R Cunningham, USA, Mr. Drew Cherry, USA, Ms. Amy R McGrath, USA
Right-sizing The Logistics Deployment Footprint To Meet Required Metrics, Mr. Thomas T Collipi, Mr. Michael H Albright
Implications Of Material Availability and Ownership Cost As A Key Performance Parameter and Key System Attribute , Mr. Thomas T Collipi, Mr. Michael H Albright
Net Present Value Analysis for Fleet Replacement Options, Mr. Saiful Hannan, USAF, Maj. Thad Middleton, USAF
CS-CSS Unit Integration into ARFORGEN, Mr. Alan R Cunningham, USA, Mr. Mark P Schairbaum, USA, Mr. Kevin Keaveney
Methodology For Conducting Trade Studies With Cost And Operational Implications, Mr. Thomas T Collipi, Mr. Michael H Albright

Preliminary Agenda for Working Group 28 - Decision Analysis
Chair: Maj KiraBeth Therrien, Kirabeth.Therrien@osd.mil
Co-Chair: Don Buckshaw, dbuckshaw@innovativedecisions.com
Co-Chair: Bill Hensley, Bill.Hensley@OHIO-KENJYA.com
Co-Chair: LTC Brian Sperling, Brian.Sperling@usma.edu
Co-Chair: Gerald Kobylski, Gerald.Kobylski@usma.edu
Co-Chair: Drew Miller, drdrewmiller@aim.com
Co-Chair: John Tindle, John.tindle@ngc.com
Co-Chair: Michael Miner,
Advisor: Nisha Shah, nisha.r.shah@boeing.com

Capabilities Needs Analysis: Decision Analysis for Building the Future Force, Mr. Ronald F Salyer, LTC Sean Deller, USA, MAJ Aaron Swain, USA
Soft metrics for decision analysis under uncertainty, Dr. Michelle D Quirk
Modeling and Trading Systems between Joint Capability Areas, Dr. Mark Gallagher, USAF
Advanced Collaborative System Optimization Modeler (ACSOM), Mr. Stephen H Rapp, Mr. Douglas R Rogers, Mr. Gregory D Hartman
Implementation of Verification and Validation (V&V) Attributes as a Practical Approach, Mr. Joseph Olah
"Validating the Performance of Networks Used to Model Decisions Involving the UAV", LTC Gerald Kobylski, USA, Dr. Dennis Buede, Mr. Michael Cassidy, Mr. Jim Chinnis
Decision-Making at the Company/Platoon Level: Decision Analysis and Current Planning Doctrine., MAJ Rob A Dees, USA
Soldier as a System Value Analysis, MAJ Melanie Carlson, USA
Using the Swing Weight Matrix to Improve Decision Analysis Studies, Dr. Gregory S Parnell, USA
Comprehensive Analytic Framework for AF Fighter Force Recapitalization, Lt. Col. Mark Foringer, USAF, Mr. Jim Holt, USAF, Mr. Michael Larkin, USAF, Mr. William Troy, USAF
Integration of Iraqi and Coalition Reports, Mr. Scott Sanborn, USA, LTC Kirk C Benson, USA, Mr. Kyle Minor, USA, Mr. John Warren, USA
Insights from Operational Availability 2008, Dr. Christopher M Hill, JCS
Commander Air Force Forces (COMAFFOR) Assessment, Lt. Col. David R Denhard, USAF, Lt. Col. Richard Bullock, USAF
A Constraint Management Approach to Counter-IED Technology Deployment, Mr. Leo H Jones
Quantifying the Interrelationships and Trade-offs between Capabilities and Plans: DOD's Economy of Risk, Mr. Jonathan R Charlton

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The Foundations of Force Structure Analysis: A Preliminary Investigation of Methodological Choices and Consequences, Mr. Mike Payne, USAF, Maj. Eric Murphy, USAF, Capt. Tim Booher, USAF
Business Case Analysis to Determine Best Reconnaissance Platform Contracting Option, Ms. Shawn E Bowen, USA, Mr. John Walther, USA, Mr. Scott Kooistra, USA
Actively Managing Air Fleet Lifetimes, Maj. Michael Staples, USAF, Dr. Edward Robbins, USAF
Using VFT and Optimization to Create the Acquisition Portfolio for the Marines Infantry Optics, Maj John E Smith, USMC, Mr. Fred Daubenspeck, Mr. Russell Mosier, Dr. Harry Newton, Mr. A.J. Maltenforth, Dr. Dennis Buede
Choosing an appropriate analysis method for multiple objective decision problems, Mr. Donald Buckshaw, Dr. Dennis Buede, Dr. Gregory Parnell
Homeland Security Risk Analysis for Planning and Resource Allocation, Mr. Clarke Ansel, Mr. James Lewis
Robust Sensitivity Analysis of Courses of Action Using an Additive Value Model, Mr. Hunter A Marks, USAF
Patterns of Expenditure: When Should Peak Staffing Occur?, Dr. William H Jarvis, OSD
Recent Use of DES in Naval Technology, Platform, Force Architecture, and CONOPS Evaluation Methodologies, Mr. Gregory J Opas, Mr. Timothy A Barnard, Mr. Scott C Henry, Mr. Jonathan G Slutsky
Collaborative methods and technology for capturing SME assessments, Mr. Lucas D Steinhauser, USAF
Interactive Army Campaign Plan, LTC Scott T Nestler, USA, Mr. Marc Eskew, USA
MATREX Providing Tools to Build Interoperable Network Centric M&S Environments, Ms. Lana E McGlynn, Mr. Tom Hurt, USA, Mr. Joe McDonnell

Preliminary Agenda for Composite Group F - Advances in Military Operations Research
Chair: Mr. Brian Nichiporuk, briann@rand.org
Co-Chair: Chris Herstrom
Co-Chair: Simon Goerge
Advisor: Rob Albright

Strategy, Policy, and the War on Terror: Understanding and Exploiting System Dyn, MAJ Nathan A Minami
Applications of Adversary Modeling to Information Operations (IO) and Cyber Operations, Mr. Michael Kretzer, USAF, Dr. Janos Sztipanovits, Dr. Alexander H Levis
Effectiveness of Psychological Influence Calculator (EPIC) Methodology Overview, Mr. Bud Whiteman

Preliminary Agenda for Working Group 29 - Modeling, Simulation and Wargaming
Chair: Mr. Jeff Tkacheff, jeffrey.tkacheff@usmc.mil
Co-Chair: Curt Blais, clblais@nps.navy.mil
Co-Chair: Deb Ray, deborah.ray@us.army.mil
Co-Chair: Rick Rigazio, rigazior@nwdc.navy.mil
Co-Chair: Adam Martin, adam.martin@usmc.mil
Co-Chair: Ted Roofner, ted.roofner@usmc.mil
Co-Chair: Danny Champion, danny.c.champion@us.army.mil
Advisor: Dan Purcell, Daniel.Purcell@usmc.mil

Session Theme: COIN/IW **War Gaming Analysis for the Counter-Insurgency** , LTC Loren Eggen, USA, LTC Michael Corson, USA, LTC Jeffrey Libby, USA, LTC Carlos Lizardi, USA
A Validation Framework for Validating an Irregular Warfare (IW) Simulation Using Pythagoras, Ms. Lisa J Moya
Sensible Validation for IW Simulations, Dr. Michael P Bailey, USMC, Mr. Victor E Middleton
Session Theme: Agent based modeling **PEO Soldier Simulation Road Map V**, LTC Robert H Kewley, USA
Validation, Verification and Accreditation of Agent Based Models, Dr. Deborah V Duong
Genetic Algorithm Applied to Multi-Agent War Gaming Simulation, Mr. Mark A Rivera
Session Theme: UAS **Using Simulation and Combat Modeling to Evaluate Characteristics of Unmanned Aerial Systems**, Mr. David Gibbons, USMC
Modeling Analysis Work Group (MAWG) for Unmanned Aerial Systems (UAS), COL Robert Steele, USA, Dr. Patrick Paradis, USA, LTC Kaye McKinzie, USA
Finite State Machines for Creating, Evaluating, and Refining Air-to-Air Combat Tactics, Mr. Jay Moore, Mr. Michael Pekala, Mr. Russell Turner
Modeling Uncertainty from Sensors to Decision Makers, LTC Darryl Ahner, USA, Dr. Thomas Anderson, MAJ Michael Martin, USA

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Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment, Mr. Eric S Harclerode, USA, Mr. Stephen L Colegrove, USA
Sensor Performance Optimization Tool, Mr. James S Richardson
Session Theme: Theater modeling **Implementing Sustainment Battle Command (SBC) in the Advanced Warfighting Simulation (AWARS)**, Ms. Bonnie J McIlrath, USA
Analyzing Sustainment Battle Command Enablers via Layered Networks in Discrete Event Simulations, LTC Rich Spainhour, USA, Mr. Leroy Jackson
Customized Visualization of Combat Modeling Automated, Mr. Ted W Roofner, USMC
Session Theme: IED **Agent-Based Simulation of IED Blast and Shrapnel Effects**, Mr. H. R Blacksten, Ms. Austin Zimmerman, Dr. Brett Steele, Dr. Philip Hammar, Dr. Doug Samuelson
Causal Interaction Modeling for IED Defeat, Dr. Kathryn B Laskey, Dr. Tod S Levitt, Dr. Andrew G Loerch, Mr. Ronald F Woodaman
DoDAF Models of the IED Threat, Dr. Ronald J Leach, Dr. Kathryn B Laskey, Dr. Harry N Keeling
Session Theme: Wargaming **Wargaming Community of Practice**, Mr. Ted Smyth
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton
Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White
Blue SLAACM: a Stochastic Lanchester Air-to-Air Campaign Model for Blue Attack, Mr. Jeremy M Eckhause, Mr. Robert V Hemm, Dr. David A Lee
Robust Metamodel Development for Complex Simulation Sensitivity Analysis and Validation, Mr. Mitchell C Kerman
A computational framework for deterrence assessment analyses, Dr. Michelle D Quirk
Modeling the Effects of Maintenance Capabilities on Aircraft Operations, Maj. Jennifer G Walston, USAF, Maj. Anthony F Antoline, USAF, Capt. Scotty A Pendley, USAF, 1st. Lt Frank A Iubelt, USAF
Campaign Analysis – Improving the Representation of the Joint Fight, Mr. Jim McMullin, USA
Strategic Data Farming: Verifying Wargame Adjudicators to support the Model-Game-Model Analysis Technique, Dr. Deborah V Duong
A Modeling and Simulation Approach to Analysis of Stressors on Non-Line of Sight Launch System (NLOS-LS) Control Cell Cr, Mr. Bret Kellihan
Quantifying the Survivability Onion of the Future Combat System Manned Ground Vehicle , MAJ Kenneth W Burkman, LTC Barry Ezell
Mobility Capability and Requirements Study 2008 (MCRS-08), LCDR Phillip E Pournelle, USN, LTC Mark Lukens, USA
Modeling IEDs in COMBATXXI, Mr. Jeffrey O Johnson, USA
A tool for the Analysis of the Army's Future Aviation and Ground Combat Systems, Mr. Scott R Swinsick, Mr. Rupert L Seals
Operationalizing Unmanned Aerial System (UAS) for Modeling and Simulation and Analysis, LTC Kaye McKinzie, USA, Ms. Kelaine Nick, USA, MAJ Laura Byrd, USA, Mr. Benjamin A Anderson, USA
An Analysis of Engagement Coordination Schemes for Integrated Fire Control, Mr. Christopher B Foley, Mr. Bart Paulhamus
Campaign Analysis: A Comparison of STORM and THUNDER in MCO-2, Mr. Ted K Broyhill, OSD
Air and Ground Based Non-Lethal High Power Microwave Weapons in Support of Truck Convoys in the Urban Environment, Dr. Sam H Parry, Mr. John C Sachs
Modeling Political, Military, Economic, Social, Information, & Infrastructure Factors to Support Strategic Education, LTC Edward McLarney, USA, Mr. Daniel Snyder, Mr. Paul Everson, Mr. Matthew Wilson
Studying Chemical Effects on Infantry Operations Using Agent-based Simulation , Mr. Gerald M Pearman, Dr. Tom Lucas, Mr. Victor Middleton, MAJ Jon Alt, USA, MAJ Rich Geren, USA
Collaborative Analytic War Gaming - A basic answer for complicated questions, Mr. Scott D Simpkins, Mr. James Hillman
Analysis of the Operational Effect of the Joint Chemical Agent Detector Using the Infantry Warrior Simulation (IWARS), Mr. David B Gillis, USA, Mr. Kevin M Guite, USA, Mr. Carl M Eissner, USA, Dr. George E Steiger, USA, Mr. Charles E Holman, USA, Ms. Lynn A Coles
Measuring the Value of Information and its Relationship to Military Decision-Making, LTC David Hudak, USA, Dr. Alex Pogel
Oz: A War Game Controller that supports analysis, Dr. Deborah V Duong
Determining Connectivity in the Advanced Warfighting Simulation (AWARS), Mr. Robert Horton, USA, Ms. Shaynah Schnelle, USA
Model Composition, Uncertainty Analysis, and the Missing Model Problem, Dr. Steven Bankes
Warfighting Payoff Analysis in Support of IHPRPT Beyond-Phase-III Goals, Mr. Paul F Mondragon
Organizing an Information Age Combat Force, LTC Sean Deller, USA
Evaluating Non-Combatant Evacuation Alternatives Using Optimization, MAJ Steve Sparling, USA, Dr. Rob Dell

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Preliminary Agenda for Working Group 29B - Modeling, Simulation and Wargaming B
Chair: Danny Champion, danny.c.champion@us.army.mil
Co-Chair: Mr. Jeff Tkacheff, jeffrey.tkacheff@usmc.mil
Co-Chair: Deb Ray, deborah.ray@us.army.mil
Co-Chair: Curt Blais, clblais@nps.navy.mil
Co-Chair: Rick Rigazio, rigazior@nwdc.navy.mil
Co-Chair: Adam Martin, adam.martin@usmc.mil
Co-Chair: Ted Roofner, ted.roofner@usmc.mil
Advisor: Dan Purcell, Daniel.Purcell@usmc.mil

Session Theme: COIN/IW **A Modeling and Simulation Approach to Analysis of Stressors on Non-Line of Sight Launch System (NLOS-LS) Control Cell Cr**, Mr. Bret Kellihan
Operationalizing Unmanned Aerial System (UAS) for Modeling and Simulation and Analysis, LTC Kaye McKinzie, USA, Ms. Kelaine Nick, USA, MAJ Laura Byrd, USA, Mr. Benjamin A Anderson, USA
Quantifying the Survivability Onion of the Future Combat System Manned Ground Vehicle , MAJ Kenneth W Burkman, USA, LTC Barry Ezell, USA
Session Theme: Agent based modeling **Modeling the Effects of Maintenance Capabilities on Aircraft Operations**, Maj. Jennifer G Walston, USAF, Maj. Anthony F Antoline, USAF, Capt. Scotty A Pendley, USAF, 1st. Lt Frank A Iubelt, USAF
Large Medium Speed Roll-on/Roll-off (LMSR) to Mobile Landing Platform (MLP) Assembly Simulation (LMMA), Ms. Jane A Burkett, USN, Mr. Tyson C Kackley, USN
Air and Ground Based Non-Lethal High Power Microwave Weapons in Support of Truck Convoys in the Urban Environment, Dr. Sam H Parry, Mr. John C Sachs
Session Theme: UAS **Campaign Analysis: A Comparison of STORM and THUNDER in MCO-2**, Mr. Ted K Broyhill, OSD
A tool for the Analysis of the Army's Future Aviation and Ground Combat Systems, Mr. Scott R Swinsick, Mr. Rupert L Seals
Blue SLAACM: a Stochastic Lanchester Air-to-Air Campaign Model for Blue Attack, Mr. Jeremy M Eckhause, Mr. Robert V Hemm, Dr. David A Lee
Session Theme: Sensor **An Analysis of Engagement Coordination Schemes for Integrated Fire Control**, Mr. Christopher B Foley, Mr. Bart Paulhamus
Robust Metamodel Development for Complex Simulation Sensitivity Analysis and Validation, Mr. Mitchell C Kerman
Modeling Insurgent Values for IED Attacks, Dr. Andrew G Loerch, Dr. Kenneth Hintz, Dr. Kathryn B Laskey
Session Theme: Theater modeling **Modeling and Simulation to Support Test and Evaluation of Chemical and Biological Defense Systems**, Dr. George E Steiger, USA, Dr. Thomas J Stadterman, USA, Mr. Carl M Eissner, USA, Mr. Charles Fromer, OSD, Mr. Eric Lowenstein, OSD
Analysis of the Operational Effect of the Joint Chemical Agent Detector Using the Infantry Warrior Simulation (IWARS), Mr. David B Gillis, USA, Mr. Kevin M Guite, USA, Mr. Carl M Eissner, USA, Dr. George E Steiger, USA, Mr. Charles E Holman, USA, Ms. Lynn A Coles, USA
Studying Chemical Effects on Infantry Operations Using Agent-based Simulation , Mr. Gerald M Pearman, Dr. Tom Lucas, Mr. Victor Middleton, MAJ Jon Alt, USA, MAJ Rich Geren, USA
Session Theme: IED **Strategic Data Farming: Verifying Wargame Adjudicators to support the Model-Game-Model Analysis Technique**, Dr. Deborah V Duong
Measuring the Value of Information and its Relationship to Military Decision-Making, LTC David Hudak, USA, Dr. Alex Pogel
A computational framework for deterrence assessment analyses, Dr. Michelle D Quirk
Session Theme: Wargaming **Modeling Political, Military, Economic, Social, Information, & Infrastructure Factors to Support Strategic Education**, LTC Edward McLarney, USA, Mr. Daniel Snyder, Mr. Paul Everson, Mr. Matthew Wilson
Collaborative Analytic War Gaming - A basic answer for complicated questions, Mr. Scott D Simpkins, Mr. James Hillman
Fire Support Platforms' Survivability Input Data Issue, Mr. George A Fulton, USA
Development of the "Reconstitution To The Sea Base" model , LCDR Motale E Efimba, USN, Mr. Robert J Stevenson, Mr. Brandon Eaton
MORS Irregular Warfare Workshop, "Improving Cooperation Among Nations in Irregular Warfare Analysis", Dr. Al Sweetser, OSD, Dr. Karsten Engelmann, USA
Mobility Capability and Requirements Study 2008 (MCRS-08), LCDR Phillip E Pournelle, USN, LTC Mark Lukens, USA
Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment, Mr. Eric S Harclerode, USA, Mr. Stephen L Colegrove, USA
Modeling IEDs in COMBATXXI, Mr. Jeffrey O Johnson, USA
A Validation Framework for Validating an Irregular Warfare (IW) Simulation Using Pythagoras, Ms. Lisa J Moya

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Evaluating Non-Combatant Evacuation Alternatives Using Optimization, MAJ Steve Sparling, USA, Dr. Rob Dell
Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration, Mr. Mike Kierzewski, Mr. Chris Gaughan, Mr. Frank Wysocki, Mr. Jeff White
Using Simulation and Combat Modeling to Evaluate Characteristics of Unmanned Aerial Systems, Mr. David Gibbons, USMC
Campaign Analysis – Improving the Representation of the Joint Fight, Mr. Jim McMullin, USA

Preliminary Agenda for Working Group 30- Operational Environment - Factors Interactions and Impacts
Chair: Ms. Donna Blake, dblake@aer.com
Co-Chair: Vickie Moore
Co-Chair: Dr. John R Hummel, Argonne National Laboratory, jhummel@anl.gov
Co-Chair: Joyce A Nagle
Co-Chair: C. R Nichols
Co-Chair: Carrie K Root
Co-Chair: Richard Shirkey
Co-Chair: Steve Quigley
Advisor: Niki Goerger

An Agent Based Approach to Modeling the Impact of Social Networks, Economics, and Influence and Persuasion on a Civilian, MAJ Jon Alt, USA, CDR Thorsten Seitz, USN, Maj. Todd Ferris, USAF, Mr. Leroy Jackson
Modifying Features in the Environment for Manipulating Enemy Behavior, Mr. Ben Holland
Modeling Civilian Movement in Large-Scale Scenarios, Dr. Ronald W Noel, USA
Applications of Environmental Information in Tactical Decision-Making: Real-Time Support of ASW Force Allocation, Mr. Matthew R McNamara
Maritime Domain Awareness: Process Reengineering, Ms. Susan G Hutchins, USN, Dr. Shelley P Gallup, USN, Dr. Doug MacKinnon, USN, CAPT Scot Miller, USN, Dr. Jared Freeman
A System-Impact Product for Space Situational Awareness: Validation of Spacecraft Surface Charging Specification, Dr. Robert V Hilmer, USAF, Mr. Stephen Quigley, USAF
Decision Framework for Design of a High-Fidelity Synthetic Environment supporting Unmanned Ground Vehicle Development an, Dr. Niki C Goerger, Dr. Joyce A Nagle, Ms. Victoria D Moore
Virtual Autonomous Navigation Environment Simulation Testbed, Mr. Christopher L Cummins, USA
Attribution Concepts for Sub-meter Resolution Ground Physics Models, Dr. GEORGE L MASON, Mr. CHRISTOPHER L CUMMINS, Mr. Jody d priddy, Mr. Burhman Gates
Modeling Uncertainty from Sensors to Decision Makers, LTC Darryl Ahner, USA, Dr. Thomas Anderson, MAJ Michael Martin, USA
Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment, Mr. Eric S Harclerode, USA, Mr. Stephen L Colegrove, USA
Sensor Performance Optimization Tool, Mr. James S Richardson
Infrared Scene Prediction, Mr. Chris Borden, Mr. David Berthiaume, Dr. Guy Seeley
kURT-MS, a New Faster and More Accurate Multiple Scattering Algorthm for TAWS, Dr. Prabhat K Acharya, Dr. Raphael Panfili, Dr. Alexander Berk, Mr. Richard Shirkey, Dr. Alan Wetmore
Aviation Weather Routing Tool: A Decision Aid for Manned/Unmanned Aircraft Routing, Dr. Richard Shirkey, Mr. Terry Jameson
Operational Environmental Representation in a Campaign Level Tool, Dr. LTC John Crino, OSD, Mr. Steven Barnes, OSD
Ithaca: An Unclassified Scenario Suitable for International Use, Mr. Daniel Loibl
Modeling Political, Military, Economic, Social, Information, & Infrastructure Factors to Support Strategic Education, LTC Edward McLarney, USA, Mr. Daniel Snyder, Mr. Paul Everson, Mr. Matthew Wilson
Complex Adaptive System Comparative Analysis Dynamic Environment for Emerging Societies (CASCADE-ES), Dr. John R Hummel, Mr. John H Christiansen, Dr. Mark Altaweel, Mr. Dariusz Blachowicz
Forecast and Analysis of Complex Threats, Mr. Thomas Spoon, USA

Preliminary Agenda for Working Group 31 - Computing Advances in Military Operations Research
Chair: Otis Brooks, otis.brooks@jhuapl.edu
Co-Chair: Curt Blais, clblais@nps.edu
Co-Chair: Dave Wells, david.wells@usafa.edu
Co-Chair: Jeff Dixon, jeffery.dixon@jhuapl.edu
Co-Chair: Mary McDonald, mlmcdona@nps.edu
Co-Chair: Meredith Schutt, meredith.schutt@lmco.com
Advisor: Robert Albright, robert.albright@us.army.mil

Listed below are Preliminary agendas for the Working and Composite Groups, Focus and Other Sessions. The final agendas as well as the location of the sessions will be listed in the 76th MORSS Quick Reference Program Schedule (QRPS) which will be given to you at registration at the USCGA, New London, CT, 10 June 2008.

Session Theme: Capabilities **High Performance Computer Power to Support Campaign Analysis**, Dr. LTC John Crino, OSD, Mr. "Boots" Barnes, OSD
Verification and Validation of Integrating the HPAC Model into the Joint Analysis System (JAS), Mr. Peter B Melim, Dr. John Prince
Jam Resistant Coding Without Shared Secrets, Lt. Col. Leemon Baird, USAF, Mr. William L Bahn, Mr. Mike D Collings
Session Theme: Tools & Methodologies **Measuring the Value of Information and its Relationship to Military Decision-Making**, LTC David Hudak, USA, Dr. Alex Pogel
Customized Visualization of Combat Modeling Automated, Mr. Ted W Roofner, USMC
Beyond Simulation Software: Applying Object-Oriented Analysis and Design (OOAD) Methodology Throughout a MS&A Effort, Mr. Nathaniel Horner, Mr. J. Stephen Topper
Session Theme: Concepts **PEO Soldier Simulation Road Map V**, LTC Robert H Kewley, USA
Development of Analytical Models of Blue Force Interactions with Improvised Explosive Device Incidents, LTC Darryl Ahner, USA, LTC Rich Spainhour, USA
Enabling Tactical Analysis Through Distributive Computing Techniques, Mr. John Duselis, Dr. Isaac Scherson
Session Theme: Algorithms **Developing and Modeling Rule Sets to Defend Networks**, Ms. Heidi S Vecera, Ms. Meghan Callahan
A Curvature-Constrained Motion Planning Algorithm for Mine Avoidance, Mr. Fred R Vecera, III
A computational framework for deterrence assessment analyses, Dr. Michelle D Quirk
Session Theme: Applications of Methodologies **Modeling IEDs in COMBATXXI**, Mr. Jeffrey O Johnson, USA
Optimal Scheduling of Electro-Optical/Infrared Satellite Sensors, Dr. Steve Baker, Dr. Lee Lehmkuhl, Lt. Col. Andy Armacost, USAF
A System Dynamics Approach to Strategic Communications Modeling, Mr. Craig Oeltjen
Session Theme: Concepts II **Predicting Software Costs**, Ms. Corinne C Wallshein, USAF
Exploring the Impact of Information on Small Unit Force Effectiveness, CPT Clark C Adams, USA
Techniques to Reduce Variance in Combat Modeling Results, Ms. Sarah Holden, USA, Ms. Cynthia Acord, USA
Rapid Scenario Generation and Scenario Reuse for Constructive Simulation, MAJ Jon Alt, USA, Dr. Susan Sanchez, Mr. Curt Blais, Mr. Gerald Pearman
Session Theme: Tools & Techniques **The Use of Agent-Based Modeling and Data Farming for Planning System of Systems Tests in Joint Environments**, Ms. Mary L McDonald, Dr. Gary E Horne, Mr. Stephen C Upton
Studying Chemical Effects on Infantry Operations Using Agent-based Simulation , Mr. Gerald M Pearman, Dr. Tom Lucas, Mr. Victor Middleton, MAJ Jon Alt, USA, MAJ Rich Geren, USA
Benefits and Uses of a CBRN M&S Capability Integrated into the MATREX, Mr. Chris Gaughan, Mr. Tom Hurt, Mr. Joey Fann, Ms. Lana McGlynn
Genetic Algorithm Cross-Leveling Equipment Heuristic , Mr. Jake Enholm
Joint Munitions Effectiveness Manuals Weaponeering System 2.0 – JWS 2.0, Ms. Jessica Stalnaker, USAF, Ms. Cameron McAllister, USAF, Mr. Greg Wilder, USAF
Sensor Performance Optimization Tool, Mr. James S Richardson

Preliminary Agenda for Working Group 32 - Warfighter Performance and Social Science Methods
Chair: Mr. Darryl Easler, darryl.l.easler@lmco.com
Co-Chair: Ken Comer, kenneth.comer@jieddo.dod.mil
Co-Chair: Rafael Matos, rmatos@wbbinc.com
Co-Chair: Yuna Wong, yuna.wong.ctr@osd.mil
Advisor: Mike Statkus, Michael.Statkus@us.army.mil

Employing Open Source Text Analysis for Extraction of Operationally Relevant, Spatially Referenced Socio-Cultural Data, Dr. Lucy A Whalley, USA, Mr. William D Meyer, USA, Mr. Timothy K Perkins, USA
Qualitative Social Science Methods for PMESII Analysis, Dr. Yuna Wong, OSD
Social Effects of Proximity in Scenario Development, Dr. Ronald W Noel, USA
Computational Models of Group Dynamics for National and International Security Applications, Dr. Michelle D Quirk
The Economics of Roadside Bombs, Mr. Matthew Hanson
Social Science Foundations for GWOT Analysis, Dr. Yuna Wong, OSD
An Outbrief from the "Impact of Emerging Societies on National Security" Special Meeting, Dr. John R Hummel, Dr. Theodore J

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Bennett, Jr.
Automating Forecasting and Exploration of Complex Simulation Effects, Ms. Janet Wedgwood, Mr. Zach Horiatis, Mr. John Welsh, Mr. Thad Konicki
Strategic Data Farming: Verifying Wargame Adjudicators to support the Model-Game-Model Analysis Technique, Dr. Deborah V Duong
Operations Research and the Defeat of IEDs, Mr. Kenneth Comer
Mapping urban cultural elements to mission planning information requirements: an ontologic approach, Mr. Jeffrey Burkhalter, USA
Use of Surveys in the Counter-Insurgency Fight in Afghanistan, MAJ John Michaud, USA
Developing Irregular Warfare (IW) Human Terrain Data Input for an Agent-based Model, LT Robin Marling, USN, Mr. Richard Clinger, USMC, Ms. Patricia Rossmaier, USMC, Dr. Bob Sheldon, Mr. Cortez (Steve) Stephens, USMC
Oz: A War Game Controller that supports analysis, Dr. Deborah V Duong
"That's what Bob said" - Improving Assumptions In IW Tools – A Case Study, Dr. James G Stevens, OSD, Ms. Danielle Miller, OSD
Dangerous Liaisons? Past Affairs Between DoD and Social Science During Times of Insurgency, Dr. Yuna Wong, OSD
Modeling Complex Threat Behaviors, Dr. Ronald W Noel, USA
A Modeling and Simulation Approach to Analysis of Stressors on Non-Line of Sight Launch System (NLOS-LS) Control Cell Cr, Mr. Bret Kellihan
Modeling Uncertainty from Sensors to Decision Makers, LTC Darryl Ahner, USA, Dr. Thomas Anderson, MAJ Michael Martin, USA
Modeling Macro-Cognitive Influence on Information Sharing between Members of a Joint Team, Dr. Steve Burnett
Determining Crew Size via Task Analysis, Ms. Margaret E Beecher, Mr. Michael S Moreno
A Model of Migration Choices for Undocumented Immigrants, Dr. Charles A Worrell
A System Dynamics Approach to Strategic Communications Modeling, Mr. Craig Oeltjen
Nexus: An Interpretive Social Simulation applied to the Political Economy of Rent Seeking States, Dr. Deborah V Duong
Validation, Verification and Accreditation of Agent Based Models, Dr. Deborah V Duong
Analytic Transparency – Improving Visibility, Transparency, and Accessibility for the DoD Analysis Community, Mr. Gray Gildner, OSD, Mr. Scott Ross, OSD

Preliminary Agenda for Working Group 33 - Analytical Rigor in Experimentation
Chair: Mr. Steve Notarnicola, Lockheed Martin Center for Innovation, steve.notarnicola@lmco.com
Co-Chair: Scott Hamilton,
Co-Chair: Paul Fail, SAIC, PAUL.H.FALL@saic.com
Co-Chair: Mr. Kemp Littlefield, Lockheed Martin Center for Innovation, kemp.littlefield@lmco.com
Advisor: Mr. Chris Herstrom, Raytheon Missile Systems, chris.herstrom@raytheon.com

System of Systems Measurement in Evaluation of Joint Mission Effectiveness, Mr. Mark J Fiebrandt, Mr. John Wilson
An Extended Area Protective System (EAPS) Baseline Interceptor System Effectiveness Analysis, Mr. Robert H Vasse, Mr. David F Whitten
Joint Test and Evaluation Methodology (JTEM) Analysis Support, MAJ Eric Tollefson, LTC Jeffrey Schamburg, USA, Dr. Susan Sanchez
A Historical Database of Factors of Irregular Warfare, Ms. Justine Blaho, USA, Dr. Seth Howell, USA
Robust Metamodel Development for Complex Simulation Sensitivity Analysis and Validation, Mr. Mitchell C Kerman
Power and Sample Size in a Logistic Regression Design Context, LTC Michael J Smith, USA
Experimentation Community of Practice: Status of Collaboration, Mr. Kirk Michealson
MATREX Providing Tools to Build Interoperable Network Centric M&S Environments, Ms. Lana E McGlynn, Mr. Tom Hurt, Mr. Joe McDonnell
Quantitative Analysis of Historical Data on Irregular Warfare, Dr. Seth A Howell, USA, Ms. Justine Blaho, USA
Technical Requirements Alignment Matrix - A Tool for Supporting Requirements Traceability and SE Process Development, Mr. Robert K Mock
LCS Sea Frame and SUW Mission Package - Weapons Effectiveness Study, Mr. Richard C Rigazio, USN
Sensible Validation for IW Simulations, Dr. Michael P Bailey, USMC, Mr. Victor E Middleton
OTC Analytic Simulation and Instrumentation Suite (OASIS) Brings Live Players to MATREX, Mr. Jimmie S Smith, Mr. Gary M Smith, Ms. Lana E McGlynn
When Academia Meets Reality: Negotiating an Experimental Design, Mr. Paul J Bross, Ms. Julie Sanchack
Can you hear me now? F-15E Enhanced Radio Test using DOE , Mrs. Cindy G Zessin, USAF, Mr. Michael H Oelrich, USAF
Mass Alert Communication for Joint Task Force Coordination, Mr. Joseph A Root, Lt. Col. Kenneth C Ragsdale, USAF
Efficient Design of Experiments Application to Analysis of Notional Obscurant Artillery Round Effectiveness, Dr. Thomas A Donnelly,

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Dr. Roger Davis, Mr. John Walstrum, Mr. William Rouse
System-of-System Analysis and Experimentation for the Future Force Warrior, Dr. Robert S Alexander, Mr. William F Harris
Techniques to Reduce Variance in Combat Modeling Results, Ms. Sarah Holden, USA, Ms. Cynthia Acord, USA
The CREATIVE Decontamination Performance Model, Ms. Erin E Shelly, Dr. Brent Mantooth, Dr. Roger Davis, Mr. Joshua Combs
Synthesizing Information for Senior Policy Makers using Simulation: Working through an EBO challenge problem with system, Dr. Corey Lofdahl
Use of Confidence Intervals for Comparing Force Package Capabilities, Mr. James S Richardson
Exploratory Analysis – Using All the Tools in Our Kitbag, Dr. Robert S Alexander, Mr. Michael E Garrity

Preliminary Agenda for Distributed WG IED - Improvised Explosive Devices
Chair: Dr Steve Riese, JHU/APL, stephen.riese@jhuapl.edu
Co-Chair: Dr Goerge Stone, Alion Science and Technology, gstone@alionscience.com

Operations Research and the Defeat of IEDs, Mr. Kenneth Comer
Weapons Cache Characterization, Mr. Donald W Amann
Analyzing Weapons Cache Finds in Iraq in Order to Improve Weapons Cache Search and Targeting Strategies, Capt Earl Richardson, USMC, Capt Joseph Mlakar, USMC, Capt Tom Tsoutis, USMC, Mr. Douglas Hoffman
Development of Analytical Models of Blue Force Interactions with Improvised Explosive Device Incidents, LTC Darryl Ahner, USA, LTC Rich Spainhour, USA
Identifying Socio-Cultural Spatial Signatures for Command-Wire IED Threats, Mr. Jeffrey Burkhalter, USA, Mr. Samuel Hunter, USA, Dr. Dawn Morrison, USA
Applying Crime Mapping and Analysis Techniques to Forecast Insurgent Attacks in Iraq, Capt Joseph Mlakar, USMC, Maj Paul Schneider, USMC, MAJ Andy Farnsler, USA, Mr. Douglas Hoffman, USMC
The Impact of Route Clearance Teams on Coalition Force Operations, Mr. Clarence K Haubner, USA
DoDAF Models of the IED Threat, Dr. Ronald J Leach, Dr. Kathryn B Laskey, Dr. Harry N Keeling
Modeling IEDs in COMBATXXI, Mr. Jeffrey O Johnson, USA
Improvised Explosive Devices in Iraq: Injury Patterns, Severity, and Outcomes, Ms. Amber L Wade, Mr. Michael R Galarneau
Agent-Based Simulation of IED Blast and Shrapnel Effects, Mr. H. R Blacksten, Ms. Austin Zimmerman, Dr. Brett Steele, Dr. Philip Hammar, Dr. Doug Samuelson
Air Mobility Counter IED Effects in OIF, Capt. Stephen O'Leary, USAF, Dr. John Borsi, USAF, Lt. Col. J. D. Hunsicker, USAF
Strategic Impacts of the IED , Dr. Steve Riese
Modeling Insurgent Values for IED Attacks, Dr. Andrew G Loerch, Dr. Kenneth Hintz, Dr. Kathryn B Laskey
IED ATTACKS, CONFLICT ENTERPRISE, AND SUSTAINED CONFLICT, Dr. Milt Pappas, LTC Robert D McKenzie, USA, Dr. Craig A Schultz
A Report on the Sponsor Focused Colloquium on Operations Research Methods for IED Defeat, 13-15 November 2007, Dr. Steve Riese
Operational Analysis in Support to IED Defeat, MND-N (25th ID), OIF, Jan-Oct 07, MAJ Russell J Schott, USA
Operations Research in the Counter-IED fight., Capt Anastasios Tsoutis, USMC
Causal Interaction Modeling for IED Defeat, Dr. Kathryn B Laskey, Dr. Tod S Levitt, Dr. Andrew G Loerch, Mr. Ronald F Woodaman
Evaluating Visual Detection of IEDs, Dr. Jennifer S Murphy, Dr. Terry W Stanard, Dr. Grayson Cuqlock-Knopp, Dr. Alan Ashworth, Ms. Kristin M Schweitzer, Dr. Adrienne J Raglin
The Economics of Roadside Bombs, Mr. Matthew Hanson
Optimized Routing of Unmanned Aerial Systems for the Interdiction of Improvised Explosive Devices, Maj Daniel N Reber, USMC, Dr. Johannes O Royset
A Constraint Management Approach to Counter-IED Technology Deployment, Mr. Leo H Jones

Preliminary Agenda for Demonstrations
Chair: Maj. KiraBeth Therrien, USAF, Kirabeth@verizon.net
Co-Chair: Maj Jonathan Steckbeck, USAF, HQ USAF/A9, jonathan.steckbeck@pentagon.af.mil

Introduction to the Operating and Support Cost Analysis Model (OSCAM), Ms. Mary M Mertz, USN, Mr. Geoffrey Pawlowski, USN
Systems Effectiveness Analysis Simulation (SEAS), 1st. Lt Christopher G McChesney, USAF
Demonstration of Algernon Wargame, Mr. Mike Ottenberg, OSD

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Demonstration of Irregular Warfare (IW) Pythagoras Modeling Suite, LT Robin Marling, USN, Mr. Steve Upton, USN, Mr. Edmund J Bitinas, Dr. Bob Sheldon
Space Analysis Resource Portal (SARP) and the Authoritative Data (AD) functionality, Ms. Kathy M Gue, USAF, Dr. Lee L Leber, USAF, Ms. Kathie Reece, USAF
Enigma — a Rated Management Tool, Maj. Jonathan Steckbeck, USAF
Quantifying Campaign Effectiveness & Cost: Full-Factorial Design of Experiments Investment Analysis Tool, Mr. Patrick Prostko, USN, Mr. Josh Sorkin, USN
Joint Analysis System (JAS) Demonstration, Mr. Peter Melim

Preliminary Agenda for Focus Session FS-IA
Information Assurance
Chair: Donna Gregg, Donna.Gregg@jhuapl.edu

Hybrid Simulation And Virtualization Research For Information Assurance Analysis, Mr. Michael J McDonald, Mr. Thomas D Tarman, Mr. Peter E Sholander
IP/IA Considerations for Technical Performance Criteria for Nuclear Command and Control, Mr. Michael J Silberglitt, Mrs. Laura A Nolan
Simplifying and Standardizing Cyber Risk Management, Mr. Donald L Buckshaw, Dr. Daniel T Maxwell
The Network Risk Assessment Tool (NRAT), A Case Study, Mr. Bud Whiteman
Information Assurance Test and Evaluation Process: An ATEC Perspective, Mr. Dwayne T Hill, USA, Ms. Melanie Miller, USA
Interactive Systems Simulation and Analysis for IA with the Umbra Environment, Mr. Michael J Skroch, Mr. Fred J Oppel III

Preliminary Agenda for Focus Session FS-DHS
Homeland Security
Chair: Dr. Arch Turner, DHS S&T Directorate, arch.turner@dhs.gov

Risk Assessment and Management Challenges in DHS Resource Allocation, Mr. Mark Hanson
Consequence Management Response Study, Mrs. Lisa Seymour, OSD
Determining the Appropriate Size for FEMA's Force Structure, Mr. David Ashley
Driving Improvement at TSA: Our "Balanced Scorecard" for Operations, Mr. Robert Scanion
TSA Staffing Allocation Model (SAM) Process, Mr. Michael Coffman
Border Control: Linking Funding to Performance, Mr. Gregory Pejic
Federal Air Marshall Resource Allocation Challenges, Mr. Mark Kukulich, Mr. James Curren
Border Security Analysis: Findings and Challenges, Dr. Joseph Chang

Preliminary Agenda for Poster Session
Chair: Duane Boniface, DBoniface@absconsulting.com

Risk Assessment and Management Challenges in DHS Resource Allocation, Mr. Mark Hanson

Approved and Accepted Abstracts

A Methodology for Analyzing Learning Variation

AbstractID: 378

Dr. Sylvia Acchione-Noel, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1401, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-5859
DSN: 258-5859
FAX: 575-678-7042
Sylvia.acchionenoel@us.army.mil

The United States Army Engineering School (USAES) identified sources of variation that were known to impact the training efficiency and effectiveness of Army Construction Equipment Operators and could be problematic for the future consolidation to military occupational specialty (MOS) 21E (Super) as well. Weather, in particular, was known to greatly impact instruction time during practical exercises. The USAES had documented the dates and duration of inclement weather and heat category (HEATCAT) events and understood the training losses in terms of schedule hours, but the learning losses were unknown. Utilizing activity theory and Fleishman's taxonomy of human abilities, the US Army Training and Doctrine Command Analysis Center at White Sands Missile Range (TRAC-WSMR) worked with instructors to link instructional methods with the practice of specific human abilities and to estimate the speed of learning associated with such practice. Then, leveraging techniques from psychophysical scaling and multi-attribute decision-making (MADM), TRAC-WSMR developed a compensatory additive value model to capture learning variations as part of a Training Effectiveness Analysis. The benefits of a lesson plan executed under ideal conditions were compared to those of a degraded plan in which training opportunities were lost due to weather. Understanding where the variation occurred the most and the extent of its impact on learning consistency provided the focus for corrective action and laid the groundwork for evaluating training alternatives.

kURT-MS, a New Faster and More Accurate Multiple Scattering Algorthm for TAWS

AbstractID: 438

Dr. Prabhat K Acharya
Spectral Sciences, Inc
4 Fourth Ave
Burlington,MA 01803
781-273-4770
FAX: 781-270-1161
prab@spectral.com

Dr. Raphael Panfili
Spectral Sciences, Inc
4 Fourth Ave
Burlington,MA 01803
781-273-4770
rpanfili@spectral.com

Dr. Alexander Berk
Spectral Sciences, Inc
4 Fourth Ave
Burlington,MA 01803
781-273-4770
lex@spectral.com

Mr. Richard Shirkey
U.S. Army Research Labs
Battlefield Environment Directorate
WSMR,NM 88002
505-678-5470
rshirkey@arl.army.mil

Dr. Alan Wetmore
U.S. Army Research Labs
2800 Powder Mill Rd
Burlington,MD 20783
301-394-2499
awetmore@arl.army.mil

Sophisticated algorithms that take into account the prevailing battlefield terrain and weather conditions are increasingly being used to detect enemy targets. For Army ground-to-ground scenarios, the Tri-Service Target Acquisition Weapons Software (TAWS) is used to determine the probability of detecting targets under prevailing weather conditions. It is critical that the radiative transfer (RT) algorithms at the heart of this code yield exceptionally fast and accurate at-sensor radiances. Currently, TAWS has significant shortcomings in the way it computes multiply-scattered (MS) radiance. In the visible and near-IR wavelengths, MS radiance can be a significant component of the total line-of-sight (LOS) path radiance. The 2-stream delta-Eddington plane-parallel method, while being very fast, is fairly inaccurate, has critical shortcomings in computing near-horizontal line-of-sight (HLOS) scattering, and has a singularity for a zenith angle of exactly 90°. A more accurate MS method with little or no sacrifice in computational speed is needed. We have demonstrated a new radiation transport capability that combines an efficient multiple-LOS (MLOS) multiple scattering algorithm with a broad-bandpass correlated-k methodology called kURT-MS, where kURT stands for correlated-k-based Ultra-fast Radiative Transfer. The MLOS capability is based on DISORT and MODTRAN (both industry-standard state-of-the-art RT codes) and exploits the existing MODTRAN-DISORT interface. kURT-MS, derived from MODTRAN's correlated-k parameters, is a new sensor-specific, fast radiative transfer formalism for UV-visible to LWIR wavelengths. Scattering parameters, blackbody

and solar functions are cast as a few sensor-specific and bandpass-specific k-dependent source terms for radiance computations. Preliminary transmittance results are within 2% of MODTRAN with a two orders-of-magnitude computational savings. Preliminary radiance computations in the visible spectrum are within a few percent of MODTRAN results, but with orders-of-magnitude speed up over comparable MODTRAN runs. We hope to have kURT-MS integrated into TAWS in the near-future.

Exploring the Impact of Information on Small Unit Force Effectiveness

AbstractID: 381

CPT Clark C Adams, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-2249
DSN: 258-2249
FAX: 575-678-8074
clark.adams@us.army.mil

The U.S. Army has adopted digitized concepts and capabilities over the past decade. Those concepts have been extended and fully embraced by the Ground Soldier System (GSS) program; that program outlines the expectation that, “networking small unit leaders, sensors, and Soldiers must enable geographically dispersed Soldiers to collaboratively influence a larger area with greater precision, speed, and a broader variety of lethal effects.” While these concepts have also been widely endorsed in the Future Combat System (FCS) program, the ability to represent the network and measure its contribution to the overall effectiveness of a combat force has proven to be more difficult. The original suite of available analytic tools more than satisfactorily measured the lethality and survivability of a force, but was found lacking when used to explore the contribution of information as an element of combat power and the ability of a network to provide information to the warfighter.

To appropriately portray the impacts of information on small unit performance, TRAC’s combat models are being matured to better represent the effects of information sharing on decision-making, maneuver, firepower, and protection at the individual Soldier level. The team is developing dynamic decision-making logic and behaviors within the new COMBATXXI model that will better enable the ability to assess the impact of information on battle outcomes. In addition, to better understand the value of the information provided, TRAC has developed Measures of Performance (MOP) to characterize the quality of data and information available to Soldiers over time to support his cognitive processes. It is intended to explore how well ‘the network’ detects, processes, transmits, distributes, and presents data and information and what potential benefits are gained in terms of battle command and force effectiveness.

This presentation will address how these analytic and modeling challenges will be addressed to inform key issues in support to a 2nd QTR FY08 GSS Milestone B decision.

Modeling Uncertainty from Sensors to Decision Makers

AbstractID: 241

LTC Darryl Ahner, USA
U. S. Army TRADOC Analysis Center, Monterey
P.O. Box 8695
Monterey,CA 93943
831-656-7574
darryl.ahner@us.army.mil

Dr. Thomas Anderson
Engineering Research Development Center
ERDC
New Haven,CO 80751
831-656-3087
thomas.anderson5@us.army.mil

MAJ Michael Martin, USA
U. S. Army TRADOC Analysis Center,
P.O. Box 8695
Monterey,CA 93943
831-656-7580
michael.martin9@us.army.mil

Uncertainty, commonly referred to as the ‘fog of war’, has an impact on all aspects of the battlefield. The US Army Training and Doctrine Command Analysis Center (TRAC), has developed three interacting models which represent not only how people and organizations seek to resolve uncertainty, but how to represent uncertainty in simulations in the first place.

This research consists of three main components: modeling false positive perceptions, fusing ambiguous sensor data, and measuring the impact of uncertainty on decision making. By modeling false positive perceptions, we seek to inject uncertainty into a simulation by replicating errors induced at the sensor level. In the fusion of ambiguous sensor data, we then examine techniques for robust association of potentially erroneous sensor data to create a coherent situational awareness in the presence of uncertainty. And lastly, we present a model for representing the impact that uncertainty has upon the decision maker, who must take action on an uncertain battlefield.

Development of Analytical Models of Blue Force Interactions with Improvised Explosive Device Incidents

AbstractID: 245

LTC Darryl Ahner, USA
U.S. Army TRADOC Analysis Center, Monterey
P.O. Box 8695
Monterey,CA 93943
831-656-7574
darryl.ahner@us.army.mil

LTC Rich Spainhour, USA
U.S. Army TRADOC Analysis Center, Monterey
P.O. Box 8695
Monterey,CA 93943
831-656-7579
rich.spainhour@us.army.mil

Effective IED incidents are catastrophic events that often result in loss of lives. These incidents may occur regularly in large geographic areas but as the geographical space is divided into smaller areas and blocks of time, these incidents become rare in the overall data set. While the resolution of this temporal and spatial division is necessary to determine relevant factors, it creates data that are atypical of the type of data on

which classical statistical analysis techniques perform best.

This rare data difficulty must be addressed when attempting to create a model development methodology and the associated analytical models that account for the interactions between blue force activity and IED incidents if these models are to be useful. The primary goal of this effort is to understand the relationships within the operational environment, the threat forces, and the blue forces and determine which factors/attributes most influence actions and the extent of that influence.

System-of-System Analysis and Experimentation for the Future Force Warrior

AbstractID: 144

Dr. Robert S Alexander	**Mr. William F Harris**
SAIC	TRADOC Capabilities Manager - Soldier
5400 Shawnee Rd	Suite 632, 6751 Constitution Loop
Alexandria,VA 22312	Ft Benning,GA 31905
301-807-3569	706-545-6826
robert.s.alexander@saic.com	williamf.harrisiii@us.army.mil

The Army's Future Force Warrior (FFW) Advanced Technology Demonstration recently concluded after five years of intense work to develop an integrated Soldier ensemble as part of the Rifle platoon of the future. The program goals were to design, build, and demonstrate a platoon architecture that maximized combat effectiveness of the dismounted Rifle platoon while meeting several very tight constraints of cost, weight of the Soldier load, and power consumption capabilities. In order to meet these goals, the FFW program needed to assess its prototype platoon by analysis of proposed concepts and capabilities as well as actual field experimentation. The conduct of the analysis and experimentation effort for FFW was integral to the success of the program. It also provided numerous lessons about how to structure such efforts in the context of a team with wide-ranging interests that included technology development, architectural design, Soldier effectiveness, and programmatic effectiveness.

One key lesson from the FFW analysis and experimentation effort is that analysis should begin very early in the program so that initial architectural issues can be resolved with a preliminary understanding of the effect on combat effectiveness, cost, weight, and power consumption of various design tradeoffs. Another lesson is that analysis and experimentation should be tightly linked, although this may be difficult to implement in practical terms. Programmatically, who is the advocate for the analysis effort? The technology providers are not the natural advocates, since tradeoff analysis and experimentation can be viewed as threats to the continued inclusion of any particular technology. Engineers and architects may be more concerned with technical aspects of the system, elegance of design, and ease of implementation rather than combat effectiveness, cost, or weight. Clearly, the Program Manager and System Engineer need to be active advocates for analysis and experimentation in order for these activities to play a meaningful role in the program. A final lesson is that analysis and experimentation provide the only quantitative means for outward focus, that is, for convincing senior decision-makers of the value of the system to the military of the future.

Exploratory Analysis – Using All the Tools in Our Kitbag

AbstractID: 145

Dr. Robert S Alexander	**Mr. Michael E Garrity**
SAIC	SAIC
5400 Shawnee Rd	5400 Shawnee Rd
Alexandria,VA 22312	Alexandria,VA 22312
301-807-3569	703-333-5517
robert.s.alexander@saic.com	michael.e.garrity-2@saic.com

Operations Research offers many analytic tools to apply to issues at hand. Rather than forcing questions into a format that some tool can answer, the wise analyst understands the question first and tailors a corresponding approach. Exploratory Analysis is an approach designed to address cost-effectiveness questions of a system of systems. Specifically, this approach was used by the U.S. Army's Future Force Warrior (FFW) Advanced Technology Demonstration to estimate the cost-benefit of various Soldier and small-unit capabilities, where benefit is a measure of combat effectiveness and cost is a function of life-cycle dollar cost, Soldier load, and power consumption constraints.

Exploratory Analysis is a four-step process. First, Soldier input about the military context and tactical employment of proposed capabilities is elicited through focused Map Exercises (MAPEX) and Soldier surveys. Second, force-on-force simulation of the small combat unit based on Soldier input in representative environments measures the contributions of a large number of factors (i.e., proposed Soldier capabilities) in various combinations. Third, regression is used to estimate the marginal benefit to combat effectiveness of each factor and selected interactions of factors. Fourth, mathematical programming is used to conduct cost-benefit analysis by combining these estimates of benefit with cost, weight, and power consumption data. Costing, Soldier load, and power and energy analysis are conducted in parallel to provide "costs". Exploratory Analysis is able to reduce a very complex system of systems, the future Rifle platoon, to single measures of specific components of the system, and estimate the cost-effectiveness of each component under various cost-, weight-, and power-constrained conditions.

Exploratory Analysis (not to be confused with a similarly-named analysis approach developed by RAND Corporation) is based on an analytic framework developed in the 1990's at the U.S. Army's Concept Analysis Agency (now Center for Army Analysis), called Value Added Analysis, which looked not at individual components provided to a Soldier, but at major Army weapon system programs such as digitization of the force, Abrams tank upgrades, the Comanche helicopter, and the Crusader artillery system.

Visualization of Selected Data in Stability Operations

AbstractID: 353

Dr. Patrick D Allen
General Dynamics UK Ltd
14408 Chantilly Crossing Lane #120
Chantilly,VA 20151
+44-(0)1424-798-390
FAX: +44-(0)1424-798-417
patrick.allen@generaldynamics.uk.com

Stability operations occur in complex environments involving many actors with varied interests. One important requirement is to understand where each actor derives its base of power, both in terms of primary and secondary sources of power. Identifying the sources of power is essential to supporting good actors and neutralizing bad actors. In a similar manner, identifying sources of conflict and cooperation among various actors is essential to creating a stable environment. Identifying and supporting cooperative arrangements among good actors, and disrupting the same among bad actors, is essential in stability operations. Lastly, identifying aligned and conflicting objectives, and which objectives are based on fear of future possible events, is essential to identifying commonly agreed upon solution positions and mitigation strategies. This paper presents methods to visualize, populate, and utilize these three types of critical relationships in modern stability operations.

Expanding Mobility Global Reach

AbstractID: 394

Ms. Diane B Allen
Northrop Grumman (supporting USTRANSCOM JDPAC)
709 Ward Dr.
Scott AFB,IL 62225
618-220-5139 DSN: 770-5139
FAX: 618-220-5125
diane.allen.ctr@ustranscom.mil

Rapid Global Mobility depends upon the Strategic En Route System (ERS), a series of bases, personnel and support equipment that keep the mobility mission operating worldwide. The ability to move people and equipment East and West from CONUS to Europe, the Middle East and the Pacific has come to be known as the strategic “super highway”. However, we are less capable delivering to emerging areas of interest such as Africa, South America, and Southeast Asia. Through multiple En Route Infrastructure Steering Committees, USTRANSCOM and geographic COCOMs have been working to extend our global reach to areas where access is more difficult including large portions of the Southern Hemisphere. The recent stand up of AFRICOM has made the challenge even more pertinent. Our current routing and infrastructure have strong analytic underpinnings; the new challenge is to develop similar rigor for identifying the best locations and required infrastructure to support these emerging regions. This on-going analysis builds upon and applies, among other things, a value-focused thinking approach developed by former AFIT students for global air mobility. A current challenge is to expand the air-centric focus to include seaports, road and rail infrastructure, and geopolitical factors. This expanding area of analysis will be used in the USTRANCOM Commander-directed Global Access and Infrastructure Assessment.

N-UCAS Modeling, Simulation, and Analysis Overivew

AbstractID: 509

Mr. Ken A Amster
Naval Air Warfare Center, Weaons Division
1 Administration Circle
Ridgecrest,CA 93555
760-939-3186
kenneth.amster@navy.mil

The Naval Unmanned Combat Air System Program Office (PMA-268) sponsored an analysis effort to guide the development of a carrier-based, Unmanned Combat Air Vehicle (UCAV). This analysis investigated capability trades of aerodynamic performance, avionics, weapons capabilities, and on-board decision making and reasoning algorithms. It also assessed the technology maturity of critical technologies such as sensor performance, on-board decision making, and command and control systems, along with the associated architectures necessary to support these capabilities. This study integrated results from quantitative modeling and simulation efforts that assessed warfighting effectiveness, designed notional air vehicles, and qualitatively evaluated technology performance and maturity. These interrelated efforts were heavily dependent upon support from threat analysts and military experts who developed design reference missions and supporting CONOPS. The findings were integrated to provide the Program Office with guidance on the relative warfighting benefits of key capabilities and the technological risks associated with requiring a UCAV to have those capabilities.

Use of Conceptual Models in Support of JFIIT Assessments

AbstractID: 38

Mr. Robert J Anderson
Joint Fires Integration and Interoperability Team (JFIIT)
104 Biscayne Rd. Bld 637
Eglin AFB,FL 32542
850-882-6700x7518
DSN: 872-6700x7518

FAX: 850-882-8467
robert.anderson.ctr@eglin.af.mil

The Joint Fires Integration and Interoperability Team (JFIIT) provides support to United States Joint Forces Command (JFCOM) J7, J8, and J9 by conducting capability assessments, primarily at tactical levels, in areas relevant to:
• Joint Intelligence, Surveillance, and Reconnaissance support to maneuver
• Joint air-to-ground fires integration with maneuver.
Both efforts involve assessment of Joint Fires related Universal Joint Tasks (UJT) with various levels of operational realism and analytical rigor. The efforts rely on detailed plans that include requirements for scenarios, metrics, check-lists, data collection and other items necessary to support assessment conduct, analysis and reporting.
To support the breadth, depth and tempo of these assessments, JFIIT relies on reusable assessment plan templates. These templates incorporate conceptual models which involve DoDAF Operational Views (OV) and System Views (SV). JFIIT pulls standard OVs and SVs from JFCOM Joint Architectures (J89) and JFCOM Joint Training Directorate and Joint War Fighting Center (J7/JWFC) based on UJTs under assessment. JFIIT analysts refine the OV/SVs to support assessment objectives and the resulting conceptual models serve three purposes:
• Support efforts to ensure that assessments include appropriate presence and functionality of JFCOM elements of joint context
• Support assessment methodology development
• Support determination of instrumentation and data collection requirements.
JFIIT analysts enhance various architectural products in support of specific assessments, and then submit modified product feedback to J89 and J7/JWFC. The feedback results in better support for JFIIT capability assessments, and shows promise to improve DoD Joint Fires related capabilities-based planning, experimentation, training, education, and lessons learned.

Stability Operations Army Strategic Theater-Level Workshops

AbstractID: 319

Mr. Greg Andreozzi, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5665
DSN: 656-5665
FAX: 703-806-5724
greg.andreozzi@us.army.mil

The Center for Army Analysis (CAA) teamed with the TRADOC Analysis Center (TRAC) to conduct a stability operations strategic theater-level gap analysis project for the Army G-3/5/7. The study's goal is to identify Army stability operations capability and capacity gaps and their mitigation strategies. The project uses Department of Defense Directive 3000.5, Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations and National Security Presidential Directive 44 as the baseline documents to define the Army's role in stability operations. The study builds upon previous efforts conducted by TRAC and CAA at the operational level.

CAA hosted a series of workshops to support this project. Using the Department of State Post Conflict Reconstruction Task Matrix as the baseline task list for a stability operations mission, a Task Development Workshop was conducted to identify stability operations Army strategic theater-level tasks. Following this workshop, the project team built conditions and standards for the identified missions/tasks and developed a strategic framework to an existing scenario for use in a second workshop. This Force Structure Assessment workshop determined Army strategic theater-level force capabilities required to execute the tasks identified during the first workshop and consequently determined capability gaps. Results were provided to a CAA capacity analysis supporting the gap analysis project. Following the conclusion of the capacity analysis, a third workshop was conducted to determine DoD mitigation options for identified stability operations Army capability and capacity gaps.

The presentation will provide an overview of the three workshops supporting the Army G-3/5/7 Stability Operations Gap Analysis project.

Measuring Training ROI: Silver Bullet or Urban Legend?

AbstractID: 261

Mr. Nickolas P Angelo, USAF
US Special Operations Command
7701 Tampa Point Blvd
MacDill AFB,FL 33621-5323
813-826-9369
DSN: 299-9369
FAX: 299-9330
angelon@socom.mil

The Department of Defense (DOD) trains its soldiers, sailors, and airmen in the employment of weapon systems through an array of live, virtual, and constructive (LVC) simulation training assets. Live training involves real people operating real systems; virtual training involves real people operating simulated systems; constructive training involves simulated people operating simulated systems. Given a required training capability (output), an optimal mix of LVC assets (inputs) becomes evident for effective training programs. In the new millennium, measuring the training Return on Investment (ROI) has become a mantra for justifying the acquisition of new or improved training assets. Yet, no standardized methodology exists to determine training ROI. So, is training ROI the Silver Bullet or an Urban Legend for warranting training system acquisitions? As one detractor observed, "…the biggest value that training ROI ever produced was to sell books for a few authors, so

unless you are one of those authors, forget all you have heard and read about it…." Assuming that premise is true, an assessment of all available training metrics, to determine the benefits and the costs of training asset, needs to be examined before declaring ROI a relevant justification for training system acquisition. Re-enter the Analysis of Alternatives construct for evaluating the merits and costs training assets bring.

Homeland Security Risk Analysis for Planning and Resource Allocation

AbstractID: 347

Mr. Clarke Ansel Homeland Security Institute (HSI) 2900 S Quincy St, Suite 800 Arlington,VA 22206 703-416-3482 Clarke.Ansel@hsi.dhs.gov	**Mr. James Lewis** Homeland Security Institute (HSI) 2900 S Quincy St, Suite 800 Arlington,VA 22206 703-416-3390 James.Lewis@hsi.dhs.gov

Congress has given the Department of Homeland Security (DHS) the responsibility to coordinate homeland security programs and apply risk management principles in carrying them out. The Homeland Security Act and presidential directives have called for the use of risk management, but they have not defined how risk management is to be accomplished. In response, the Homeland Security Institute (HSI) developed a methodology, the Strategic Risk Management Framework, and a Risk Model that would allow solutions from the Science & Technology Directorate to be applied to gaps in the current set of capabilities across the DHS mission space. This framework and model helps decision makers prioritize the risk reducing utility of a wide range of programs, including both counter-terrorism and natural disaster programs. In addition, HSI proofed a concept that is currently being fully developed that will provide a risk-based methodology to prioritize resources across the entire Department. This methodology incorporates strategic objectives into the prioritization process, so that both executive level objectives and risk mitigation needs can help influence budgeting and resource development. Both methodologies attempt to answer the following questions, in relation to the Science and Technology Directorate, and the entire Department, respectively: What is the right balance of programs to address the wide scope of risk issues DHS faces? What's important, i.e., what mission outcomes do these programs achieve? How do we know whether these programs would make the homeland any safer?

Network Centric Warfare Battle Command Multi-Fidelity Multi-Resolution Modeling and Simulation with MATREX

AbstractID: 178

Mr. Sidney N Antommarchi
Dynamic Animation Systems, Inc.
12015 Lee Jackson Highway, Suite 200
Fairfax,VA 22033
703-428-6993
FAX: 703-428-3782
sidney.antommarchi@us.army.mil

Network Centric Warfare (NCW) seeks to translate an information advantage, enabled in part by information technology, into a tactical warfighting advantage through the robust networking of well informed geographically dispersed forces. MATREX provides a High Level Architecture (HLA) based set of constructive multi-fidelity & multi-resolution models and a Model and Simulation (M&S) environment that are integrated into a solution to serve multiple uses. One of the intended uses of the MATREX solution is NCW Battle Command (BC) analysis for Simulation Based Acquisition (SBA). Specifically, the MATREX NCW analysis solution enables the Analyst to trace the effect of military information over a network linked to decision making linked to outcomes. The MATREX NCW BC analysis solution differs from past efforts in that it can collect data related to NCW Baseline Metrics that is over and beyond network delay time and decision time with multi-fidelity & multi-resolution models. Results of a sample use of the MATREX NCW BC analysis solution are presented to demonstrate current capabilities and associated limitations as well as relationships to future work.

Modeling Elements of Modern Warfare

AbstractID: 376

Maj. Michael J Artelli, USAF ACC/A9AM 204 Dodd Blvd Suite 314 Langley AFB,VA 23665 757-764-0598 DSN: 574-0598 michael.artelli@langley.af.mil	**Dr. Richard F Deckro** AFIT/ENS 2950 Hobson Way WPAFB,OH 45433 937-255-6565 x4325 DSN: 785-6565 x4325 richard.deckro@afit.edu	**Col. Daniel J Zalewski, USAF** AFIT/EN 2950 Hobson Way WPAFB,OH 45433 937-255-3636 x4894 DSN: 785-3636 x4894 daniel.zalewski@afit.edu
Maj. Sonia E Leach, USAF AFIT/ENV 2950 Hobson Way WPAFB,OH 45433 937-255-3636 x7390	**Dr. Marcus B Perry** Department of Industrial and Systems Florida International U 10555 W. Flagler Street, EC 3122 Miami,FL 33174	

DSN: 785-3636 x7390
sonia.leach@afit.edu

305-348-0128
perrym@fiu.edu

This presentation provides an analytic framework for modeling elements of modern warfare. This framework captures the morale of a deploying force and public resolve in support of their forces. The model remains a model of conflict and combat. However, some of the impacts from the political, economic, and informational instruments of power are represented in the model through the dynamic adaptation of public resolve and combat spirit.

The methodology to build the model is presented along with the submodels. Additionally, the data for a scenario based on OPERATION IRAQI FREEDOM is populated during the discussion of model development. Once the complete model is developed, there is a brief discussion on the verification and validation of the model. The verification and validation process is based on a multiple step procedure which is intended to provide confidence in the model.

Finally, two demonstrations of the potential applications of the model are presented. The first demonstration varies five key factors, providing a potential decision maker with insight to the importance of each factor. The second demonstration emphasizes the versatility and importance of feedback loops and highlights the framework's ability to include softer aspects of combat.

To Protect and to Serve: Joint Collective Protection Test Standards

AbstractID: 427

1st. Lt Stacy M Baber, USAF
28 Test and Evaluatio Squadron
203 West D Ave Building 351 Room 505A
Eglin AFB,FL 32542
850-882-7604
DSN: 872-7604
stacy.baber@eglin.af.mil

The threat of chem./bio attacks is very real and growing. Yet, the DoD chem./bio test community uses diverse standards and methods to test the adequacy of shelter protection systems. The USAF's 28 TES is leading the fight to uncover and standardize "best practices" among the service test procedures as the chair of the ColPro Systems Test Standards Panel to create and review the proposed TOP documents, suggest changes, update the procedures, and coordinate appropriate revisions throughout all Joint Service test agencies. Panel members have been selected from all JS agencies, and consist of Subject Matter Experts (SME) that represents all ColPro test areas. This presentation documents parametric analysis studies which will be used to examine the effects of variations in the test conditions on the final test results. These studies will determine if any effects noted are significant and whether maintaining specific test challenge conditions is required to perform an adequate test.

Military Transition Team (MiTT) Sourcing Analysis

AbstractID: 161

LTC Vern J Bahm, USA
Center for Army Analysis
6001 Goethals Rd
Fort Belvoir,VA 22060
703-806-5681
DSN: 656-5681
FAX: 703-806-5750
vernon.bahm@us.army.mil

One of the key components to achieving success in Iraq is the training of the Iraqi Security Forces. Military Transition Teams (MiTTs) work directly with Iraqi Army units to provide training and assistance as the Iraqi units develop into capable fighting forces. Unfortunately, the requirement for MiTTs places a significant manpower burden on the military, especially in the mid-grade officers and senior non-commissioned officers (NCOs). As of late 2007, the military reached the point where it could not meet the theater demand for MiTTs without causing significant stress on the force. The roles and the distribution of these MiTTs will have to be adjusted somehow over time as Iraqi units increase in number and become more proficient. This might or might not increase the demand to fill MiTTs. This briefing will discuss the problem, some possible solutions, and the analysis done to support the decisions on how to source MiTTs in the future in Iraq.

Mission Planning for Building Clearance/Search Teams Complimented with Unmanned Systems

AbstractID: 431

Mr. Alex Baylot
USAERDC
3909 Halls Ferry Road (CEERD-GM-M)
Vicksburg,MS 39180
601-634-3474
alex.baylot@usace.army.mil

Dr. Roger C Burk
USMA
Dept SE, Mahan Hall, Room 309
West Point,NY 10996
845-938-4754
Roger.Burk@usma.edu

Cadet Tyler H Ho, USA
USMA
Dept SE, Mahan Hall, Room 309
West Point,NY 10996
845-938-4754
Tyler.Ho@usma.edu

Cadet David JK Jeffrey, USA
USMA
Dept SE, Mahan Hall, Room 309

Cadet Clinton D.-Y. Wang, USA
USMA
Dept SE, Mahan Hall, Room 309

Cadet Chase B Hunter, USA
USMA
Dept SE, Mahan Hall, Room 309

West Point,NY 10996 845-938-4754 David.Jeffrey@usma.edu	West Point,NY 10996 845-938-4754 Clinton.Wang@usma.edu	West Point,NY 10996 845-938-4754 Chase.Hunter@usma.edu

Mission planners have virtually no capability to assess the limitations of maneuver in urban areas. Roads, buildings, structures, alleys, obstacles, debris, etc. whether damaged or intact, offer an environment with severely restricted maneuver. In particular, the development of a decision aid to determine the right mix of soldiers, unmanned ground vehicles (UGVs), and unmanned aerial systems (UASs) to reconnoiter, secure, or clear for a given set of buildings has been needed. The objective of this research was to develop “overlays” within a decision support system to help mission planners. It determines what is the most effective mix of resources to search a given building, given its characteristics, the threat, and the resources available. The formulation uses scoring and assignment algorithms to recommend the best team mix for a given situation. Furthermore, it can generalized so that the scheme will work as well for search and rescue as it does for combat situations.

Determining Crew Size via Task Analysis

AbstractID: 407

Ms. Margaret E Beecher Johns Hopkins University Applied Physics Laboratory 11100 Johns Hopkins Road Columbia,MD 20723-6099 443-778-1674 Margaret.Beecher@jhuapl.edu	**Mr. Michael S Moreno** Johns Hopkins University Applied Physics Laboratory 11100 Johns Hopkins Road Columbia,ME 20723-6099 443-778-5956 Micheal.Moreno@jhuapl.edu

Tasked with determining size and type of crew for a next generation Naval airborne platform, lead JHU/APL to develop a highly useful task analysis methodology. Our task analysis process includes systematic and early involvement of subject matter experts (SMEs). The process includes having operators of varying and appropriate backgrounds team with human systems integration engineers to compile a set of Task Networks (TNs) and a Task Analysis Matrix (TAM) containing the essential information for modeling
using the Army Research Laboratory IMPRINT Pro. Fleet personnel, including
trainers, operators and decision-makers also provided verification and validation of the TN/TAMs including quantitative human performance measurements. This talk presents a Fleet-centered task analysis process supporting a next generation platform and lessons learned during the compilation of the TNs and TAM. An in-depth discussion of the TN, TAM and associated tools and processes is provided.

In Search of a Better Space Operational Testing Model

AbstractID: 18

Col. Suzanne M Beers, USAF
AFOTEC Det 4/CC
625 Suffolk Street
Peterson AFB,CO 80912
719-556-5850
DSN: 834-5850
FAX: 719-556-5800
suzanne.beers@afotec.af.mil

Operational testing is generally conducted, in accordance with U.S. Code Title 10 requirements, at the tail end of the acquisition process to inform acquisition and operational decision makers regarding future materiel buy decisions. However, because space systems are typically procured in one-of-a-kind or small number buys, the major program decisions...design trade-offs, launch "go/no-go" decisions, C2 system activations, operational acceptance...have already been made before the system enters its operational testing phase. Because the standard aircraft OT model does not fit the space acquisition business well, AFOTEC has embarked on a mission to define a better space testing model. This paper defines the problem by providing examples of operational testing conducted on major space systems after the major acquisition and operational decisions had been made, then outlines a new space testing paradigm.

Operational ORSA Training Course

AbstractID: 130

LTC Kirk C Benson, USA Center for Army Analysis 6001 Goethals Road Fort Belvoir,VA 22060 703-806-5527 DSN: 656-5527 FAX: 703-806-5726 Kirk-benson@us.army.mil	**LTC Jeffrey Libby, USA** Center for Army Analysis 6001 Goethals Road Fort Belvoir,VA 22060 703-806-5328 DSN: 656-5328 FAX: 703-806-5726 jeffrey.libby@us.army.mil	**Mr. John Zauner,** Systems Engineering Department, US Army Logistics Management 2401 Quarters Road Fort Lee,VA 23801 804-765-4256 john.zauner@us.army.mil

The U.S. Army’s Operations Research and Systems Analysis (ORSA) community provides the majority of analytic support to in-theater commands; however, there is little training focused on ORSA personnel serving within the operational environment. This effort highlights the development of an ORSA Operational Training Course complementary/reinforcing to the ORSA Military Applications Course (ORSAMAC), Intermediate Level Education (ILE), and the FA49 Qualification-Course (Q-Course) educational opportunities. Of interest, this effort highlights course development for instruction that prepares ORSA personnel for service on a Deployed Analyst Support Team (DAST) embedded within

an operational staff such as a U.S. Army Division, Multi-National Force-Iraq, or Combined Security Transition Command-Afghanistan to name a few. Topics in the ORSA Operational Training Course include the strategic environment, historical analysis, and knowledge management along with training on statistical, decision modeling, and geospatial software applications. Results from the 3-14 MAR 07 course held at the Army Logistics Management College (ALMC) will be presented during this effort.

OIF/OEF Current Operations Reachback Support

AbstractID: 131

LTC Kirk Benson, USA Center for Army Analysis 6001 Goethals Road Fort Belvoir,VA 22060 703-806-5527 DSN: 656-5527 FAX: 703-806-5726 kirk-benson@us.army.mil	**LTC Jeffrey Libby, USA** Center for Army Analysis 6001 Goethals Road Fort Belvoir,VA 22060 703-806-5382 DSN: 656-5382 FAX: 703-806-5726 jeffrey.libby@us.army.mil

The U.S. Army ORSA community provides a centralized Reachback Cell, trained and equipped to coordinate effective and timely analytical contributions to U.S. Army ORSA personnel serving within an Operational Headquarters (Division/Corps/ASCC/EAC/Joint /Combined) environment. Essentially, this Reachback Cell is a clearing house for Operational Headquarter analytic support requirements. The Center for Army Analysis (CAA) provides the nucleus/leadership of this cell. This effort highlights the contributions of Generating Force organizations to Operational Army analytic efforts across the DOTMLPF spectrum. Of interest, this effort includes highlights of recent “reachback” projects along with recommendations for future support.

Iraqi Security Force Shaping Model

AbstractID: 132

LTC Kirk C Benson, USA Center for Army Analysis Center for Army Analysis Fort Belvoir,VA 22060 703-806-5527 DSN: 656-5527 FAX: 703-806-5726 Kirk-benson@us.army.mil

The Center for Army Analysis (CAA) provided a Deployed Analytic Support Team (DAST) to augment in-theater elements to support the Multi-National Security Transition Command-Iraq in 2007 to provide analytical assistance in determining how to best build the capacity and capability of the Iraqi Security Forces (ISF). MNSTC-I required a method to determine phased promotion policies that shape Iraqi Security Forces (ISF), specifically the Iraqi Army (IA), to an end strength requirement within a given timeframe. These promotion policies focus on Time in Grade (TIG) factors that migrate a current force structure to a desired force structure within a set timeframe which was multiyear in nature. This effort highlights the application of Operations Research (OR) methods to this multi-billion dollar program to provide a sustainable ISF.

Agent-Based Simulation of IED Blast and Shrapnel Effects

AbstractID: 35

Mr. H. R Blacksten Analytic Services, Inc./Homeland Security Institute 2900 S. Quincy St., Suite 800 Arlington,VA 22206 703-416-3210 FAX: 703-416-3149 harry.blacksten@hsi.dhs.gov	**Ms. Austin Zimmerman** Previously Analytic Services, Inc./Homeland Security Institu , austin.zimmerman@gmail.com	**Dr. Brett Steele** Previously Analytic Services, Inc./Homeland Security Institu , brett.steele@gmail.com
Dr. Philip Hammar Analytic Services, Inc./Homeland Security Institute 2900 S. Quincy St., Suite 800 Arlington,VA 22206	**Dr. Doug Samuelson** Previously Analytic Services, Inc./Homeland Security Institu ,	

703-416-1339
FAX: 703-416-3149
philip.hammar@hsi.dhs.gov

samuelsondoug@yahoo.com

This paper describes an agent-based approach to representing IED blast and shrapnel physics and resultant casualty production in a quick running, easily programmed model. Although the model does not provide the accuracy of complex computational fluid dynamic and particle ray-trace codes, it provides much greater realism and ability to represent interactions with the environment than would a simple cookie cutter model. It also provides a proper linkage to the casualty and lethality curves included in the complete IED effects model. The IED effects model was incorporated into an agent-based simulation developed for the Department of Homeland Security, Science and Technology Directorate, to explore architectural design and egress control strategies to lessen IED impacts in a subway.

A Historical Database of Factors of Irregular Warfare

AbstractID: 139

Ms. Justine Blaho, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5692
justine.blaho@us.army.mil

Dr. Seth Howell, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5413
seth.a.howell@us.army.mil

The current situations in Iraq and Afghanistan have increased the awareness and importance of understanding irregular warfare. Documents such as FM 3-24 and the Irregular Warfare Joint Operation Concept (JOC) have been written to begin addressing the problem of fighting irregular wars. Currently many databases exist, such as the Correlates of War Database, the RAND terrorism database, and CAA's conflict deployment database which relate directly to Irregular War. The CAA Irregular Warfare Database (CAA-IWD focuses on modern conflicts, and is a compilation of data on political and social aspects for these conflicts. CAA will use the database for future analysis on irregular wars. The future analysis will look at both hard and soft factors in the CAA-IWD, to determine what fields influence irregular wars the most.

The Center for Army Analysis is collecting historical data on irregular wars through The Dupuy Institute, a historical analysis organization, to better understand irregular warfare. When completed the database will have data covering a broad range of fields including basic country and conflict data, political data, force strength, causality data, strength and loss data, population data, incident data, narratives, and sources. The CAA Irregular War Database (CAA-IWD) study organizes the data for irregular wars dating back to the 1940s that include over 150 fields for each irregular war. The work done in this study is aimed at making each field in the database have one standard definition, regardless of the irregular war.

The CAA-IWD will have the capability to look at all fields for a particular irregular war at once, or look at a few irregular wars at once based on similar characteristics. The completed database will preserve all historical data supplied by The Dupuy Institute.

Agent Based Biological and Chemical Mass Casualty Event Modeling

AbstractID: 47

Ms. Janelle L Blazier
Dynetics, Inc.
1002 Explorer Blvd.
Huntsville,AL 35806
256-964-4910
FAX: 256-964-4038
janelle.blazier@dynetics.com

Dr. Craig Newborn
Dynetics, Inc.
1002 Explorer Blvd
Huntsville,AL 35806
256-964-4763
FAX: 256-964-4038
craig.newborn@dynetics.com

Ms. Yen Andrews
Dynetics, Inc.
1002 Explorer Blvd.
Huntsville,AL 35806
256-964-4334
FAX: 256-964-4038
yen.andrews@dynetics.com

Mr. Todd Burwell
Dynetics, Inc.
1002 Explorer Blvd
Huntsville,AL 35806
256-964-4654
FAX: 256-964-4038
todd.burwell@dynetics.com

The Integrated Medical Response (IMR) Model is designed to assist in the examination of a country's ability to respond to naturally occurring or intentionally introduced biological or chemical events. Whether the task is planning, assessment, and/or analysis, the IMR Model provides a method to investigate a country's medical system after a mass trauma event. It combines a database of global health and healthcare indicators, detailed information about biological and chemical agents, and medical response models based on historical data, current policy, and drills. Using queuing theory and disease spread modeling, the IMR Model takes a population through the entire event, from onset to recovery or death. The model provides a wide range of interactive charts, graphs, and formatted reports to streamline the analysis process. The IMR Model can be used to support contingency planning, policy and doctrine decisions, and casualty estimation.

Advanced Missile and Electronic Attack Effectiveness Analysis

AbstractID: 294

Capt. Timothy Booher, USAF
AF/A9FM
1777 N. Kent Street
Rosslyn,VA 22209
703-588-8289
timothy.booher@pentagon.af.mil

Advances in foreign future missile and electronic attack technologies have necessitated a revised assessment of blue air-to-air effectiveness. The threat modeling and analysis program (TMAP) provides joint intelligence-community threat models using MATLAB/Simulink, which provides a flexible and transparent threat model that can be embedded in external simulations. Leveraging TMAP, we have integrated and validated an advanced foreign missile system into the BRAWLER architecture. Using this simulation as the basis for our study, we developed a methodology to evaluate the effect of digital radio-frequency memory (DRFM) jamming. With this methodology and TMAP missile model, we were able to quantify the potential impact of jamming technology on blue effectiveness and implications to blue weapon inventories.

Cost Risk as a Discriminator in Trade Studies

AbstractID: 37

Dr. Stephen A Book
Chief Technical Officer, MCR, LLC
Suite 1050, 390 North Sepulveda Blvd.
El Segundo,CA 90245
310-640-0005x244
FAX: 310-640-0003
sbook@mcri.com

Prior to formal program initiation, analysts typically undertake trade studies to investigate which of several candidate architectures or designs can best provide a desired capability at minimum cost. However, the various candidates typically differ significantly in risk as well as in cost, but members of the Government or industry trade-study team do not have the time, and the candidate solutions usually aren't sufficiently detailed at this stage, to conduct a thorough risk analyses. Yet, those differences in risk, as well as in cost, should be taken into account to the extent possible during the trade-study decision process. Because timeliness and simplicity are key requirements of analyses undertaken in support of trade studies, what usually happens is that a “point” cost estimate, or perhaps a 50%-confidence estimate, is established for each candidate, and the go-ahead decision is made on the basis of that estimate. But a nagging question remains: "What if Candidate A, the lower-cost option based on those estimates, faces risk issues that make its 70th-percentile cost higher than that of Candidate B?" In other words, Candidate B would be the lower-cost option if the cost comparison were made at the 70% confidence level. This is the classic situation in which the decision maker must choose between a low-cost, high-risk option and a high-cost, low-risk option. This report describes a methodology that allows the program manager take account of all risk scenarios by making use of all cost percentiles simultaneously, namely the entire cost probability distribution of each candidate, not simply the point estimate or the 70% confidence cost. As it turns out, the expression of system cost in terms of a probability distribution makes it possible to estimate the probability that Candidate A will turn out to be less costly than Candidate B, and probabilities of that kind are the basis on which an informed decision can be made.

Strategic Forecasting of Russian Long Range Aviation Activity

AbstractID: 366

Mr. Sean E Bourdon
NORAD-USNORTHCOM/J84
250 Vandenberg St, Suite B016
Peterson AFB,CO 80914
719-554-5068
DSN: 692-5068
Sean.Bourdon.ca@northcom.mil

Mr. Thomas E Denesia, USAF
NORAD-USNORTHCOM/J84
250 Vandenberg St, Suite B016
Peterson AFB,CO 80914
719-554-9680
DSN: 692-9680
Thomas.Denesia@northcom.mil

A recent spate of unprecedented Russian strategic aviation activity has forced NORAD to reconsider prediction of future activity based on key indicators. A methodology, based on state transition matrices, has been developed to help increase predictive ability. The resulting representation is compact, which allows for historical trends to be extracted almost by inspection. An additional benefit of representing this activity mathematically is that it is much more conducive to applying objective assessment measures to qualify the nature of the activity.

Business Case Analysis to Determine Best Reconnaissance Platform Contracting Option

AbstractID: 226

Ms. Shawn E Bowen, USA
RDECOM, ECBC
5183 Blackhawk Road
APG,MD 21010-5424
410-436-1268
DSN: 584-1268

Mr. John Walther, USA
RDECOM, ECBC
5183 Blackhawk Road
APG,MD 21010-5424
410-436-3569
DSN: 584-3569

Mr. Scott Kooistra, USA
RDECOM, ECBC
5183 Blackhawk Road
APG,MD 21010-5424
410-436-5834
DSN: 584-5834

FAX: 410-436-4894 shawn.e.bowen@us.army.mil	john.walther@us.army.mil	scott.kooistra@us.army.mil

The military has developed a mobile reconnaissance platform, and a Full Rate Production (FRP) contract award is planned to produce additional platforms and to provide contractor logistics support. Before contract award, the program office needed to develop a contracting strategy, to include determining whether a full and open competitive approach or a sole source approach was best.

A Business Case Analysis (BCA) was performed to compare the two approaches and to determine whether the sole source approach could be justified based on performance, schedule, and cost risks. The Edgewood Chemical Biological Center's Decision Analysis Team (DAT) conducted the BCA using a multi-faceted approach: a market analysis to assess potential performance issues, and a network analysis to assess cost and schedule risks. The DAT used a qualitative assessment methodology for the market analysis, while the network analysis was based on a quantitative simulation modeling methodology. The DAT used two modeling packages for the network analysis, Venture Evaluation Review Technique (VERT) and ExtendSim OR. The network models were built using input from the program office and contracting experts to map pre- and post-award activities and their associated costs and times.

The network analysis results clearly presented the differences in the potential outcomes associated with the two basic contract approaches. Cost and schedule projections included expected values as well as best case and worst case values. These results, along with the performance assessment, provided program management with the information required to select a preferred contracting approach for the FRP contract.

Probability of Opportunity for a Hunter Killer UAS

AbstractID: 453

Mr. Jason Bowman, USAF AFRL/RBSA 2210 8th Street WPAFB,OH 45433 937-904-8060 DSN: 674-8060 FAX: 937-255-8377 jason.bowman@wpafb.af.mil	**Mr. Jeffrey Dubois** General Dyanmics - AIS 2210 8th Street; B146, Rm 121 WPAFB,OH 45433 937-255-0960 DSN: 785-0960 jeffrey.dubois@wpafb.af.mil

For the past year, the Air Force has indicated increased interest in pursuing a next generation multi-mission unmanned aerial system (UAS). The Air Force Research Laboratory (AFRL) took an early initiative in helping Air Combat Command (ACC) understand the technology and requirements trade space by designing and executing systems engineering studies both internally and with industry. One of the studies conducted over the past year involved the first step in the Find-Fix-Track-Target-Engage-Assess kill chain, finding the target.

While many engineering studies have focused on how well a sensor is able to detect a target, the question was posed, "What is the chance that a sensor will even be in the correct location to attempt to detect a target?" There are several means to answer this question, from examining sensor performance in the context of a fully populated mission model, to simple spreadsheet analysis. This presentation will discuss a few methods being used by AFRL/RB (Air Vehicles Directorate) to determine the probability of opportunity for a UAS to attempt detection of a target. These methods include the derivation of the probability of opportunity for a simple case and the use of a simple simulation for more complicated situations.

When Academia Meets Reality: Negotiating an Experimental Design

AbstractID: 48

Mr. Paul J Bross Lockheed Martin Center for Innovation 7021 Harbour View Blvd., Suite 105 Suffolk,VA 23435 757-935-9504 paul.bross@lmco.com	**Ms. Julie Sanchack** Lockheed Martin Information Systems & Global Services 7021 Harbour View Blvd., Suite 105 Suffolk,VA 23435 757-935-9438 julie.sanchack@lmco.com

The Lockheed Martin Center for Innovation is a high-end laboratory for collaborative experimentation and analysis among Lockheed Martin and its partners. The Center for Innovation provides a unique blend of systems, people, and facilities that enable a wide range of investigations, many of which involve human staff operating complex equipment and technologies in new ways. Evaluating the relative benefits to be obtained from such innovative arrangements calls for campaigns of experimentation. It is here where real-world systems, people, and constraints of cost, schedule, and availability come into collision with the ideal experimental formulations found in standard texts on experimental design. This paper examines some of the trade-offs that must be made using a recent test design as the model for what can be accomplished when experimenters and operators work together for success. A full-factorial design, which tests all possible combinations of the independent variables, could not be performed due to time constraints. Two alternatives were proposed, and Design-Expert, a commercial-off-the-shelf product, was used to evaluate both, which resulted in a wiser choice than subject matter expert opinion.

Introduction to Linear Programing with Excel Solver and VBA

AbstractID: 445

1st. Lt Corban H Bryant, USAF
28 TES/EAA
203 W D Ave, Bld 351, Ste 506a
Eglin AFB,FL 32578
850-882-6859
DSN: 872-6259
corban.bryant@eglin.af.mil

As the Imperial Fleet amasses strength to track down and crush the Rebel Alliance, the resourceful Rebellion rushes to find an optimal product mix of star fighters to sustain its desperate struggle against the Empire. Rescue the Rebellion with your expert use of Linear Programming (LP), Excel Solver, Visual Basic for Applications (VBA), and Legos!

This tutorial gives a practical, hands-on introduction to LPs, Excel Solver, and VBA. We will program and solve a variety of practice problems and interactively build a VBA program to solve LPs while changing input data and graphing results. Laptops are required for this tutorial with Solver, Analysis ToolPak, and Analysis ToolPak-VBA add-ins loaded in Excel.

Choosing an appropriate analysis method for multiple objective decision problems

AbstractID: 308

Mr. Donald Buckshaw
Innovative Decisions, Inc.
P.O. Box 231660
Centreville,VA 20120
703-761-0626
dbuckshaw@innovativedecisions.com

Dr. Dennis Buede
Innovative Decisions, Inc.
P.O. Box 231660
Centreville,VA 20120
703-761-0626
dbuede@innovativedecisions.com

Dr. Gregory Parnell
Innovative Decisions, Inc.
P.O. Box 231660
Centreville,VA 20120
703-761-0626
gparnell@innovativedecisions.com

A common class of decision problems within the Department of Defense stems from the need to help a decision maker choose the best option, or options, from a list of alternatives. In some cases, this effort can be relatively simple, especially if all of the options are good, the stakes are small or the decision maker is just looking for consensus. On the other hand, this process can be extremely complex, especially if the decision maker needs to make complicated value trade-offs among a portfolio of alternatives that can satisfy conflicting objectives. This paper examines several popular qualitative and quantitative methods for choosing among alternatives and recommends different methods for different classes of decision problems. As decision analysis professionals, we are trusted by decision makers to pick appropriate methods to assist decision making that balances the needs for meaningful analysis within the allotted time and resource constraints. Recommendations for the most appropriate methods are based on the purpose of the analysis, the ease of use of the methods, the underlying modeling assumptions and meaning of the numbers that the models produce. This paper compares several different qualitative and quantitative techniques, including the Analytic Hierarchy Process and Multiple Objective Decision Analysis.

Detailed to Aggregated: Providing Key Data to a Campaign Level Study

AbstractID: 193

Mr. Charles D Burdick
Lockheed Martin Simulation, Training, & Support
2826 Lemar Street
Silver Spring,MD 20904-1836
202-285-7105
chuck.burdick@lmco.com

Mr. David R Holdsworth
Alion Science & Technology
7701 Tampa Point Blvd
MacDill AFB,FL 33621-5323
813-826-4459
DSN: 299-4459
FAX: 813-826-3602
david.holdsworth.ctr@socom.mil

LTC John Crino, USA
OSD/PA&E Simulation Analysis Center (SAC)
1401 Wilson Boulevard, Suite 300
Arlington,VA 22209-2306
703-696-9360x3313
DSN: 426-9360
FAX: 703-696-9394
john.crino@osd.mil

OSD/PA&E representatives stated at the 75th MORSS that when data uncertainties or gaps in our analytical modeling and simulation capabilities limited our ability to model a certain operation, we needed to fall back on what we knew, such as wargaming or more detailed, but less comprehensive, models to provide the insight and detailed data to form the basis for modeling at the operational/campaign level. In a recent study of countering WMD, the Multi-Service Force Deployment document or MSFD called for Special Forces teams to work with indigenous forces at checkpoints to search for and recover loose nukes. The number, placement, and timing of the checkpoints were the primary parameters to be modified in the campaign model,

The United States Special Operations Command (USSOCOM) participated in the study, providing operational concepts for the checkpoint and reaction-force operations and detailed modeling of the checkpoint/reaction-force operations at the mission-level. Using the Pythagoras agent-based simulation they examined a number of parameters associated with the behavior of the search teams and reaction forces at the checkpoints and the small groups transporting the loose nukes. The loose nuke end-state likelihood distribution data from those runs were then incorporated into and duplicated in the Joint Analysis System (JAS) campaign model. This formed the baseline for a theater-level examination of the checkpoints in context where additional theater-level constraints and capabilities could be examined. These included assumptions about external intelligence collection and warning of approaching nukes, response times by air support and heliborne reaction forces, and how competing demands and enemy action might impact the success of the checkpoints.

This presentation focuses on the operations at the checkpoints and describes the methodology USSOCOM used in executing numerous runs of Pythagoras and the subsequent analysis done in the JAS campaign model with multiple, distributed checkpoints. It discusses the sensitivity of the outcomes at the checkpoints to the assumptions made on enemy behavior and the responses considered effective in defeating those behaviors.

Military Utility of Control of the Sky Warrior UAS from an Apache Cockpit

AbstractID: 120

Dr. Roger C Burk, USA Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-4754 roger.burk@usma.edu	**2LT David Bounds, USA** Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-2700 x82077@usma.edu	**2LT Erik Hamilton, USA** Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-2700 x89871@usma.edu
2LT T. J McHugh, USA Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-2700 x89871@usma.edu	**2LT Brian Miraglia, USA** Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-2700 X83587@USMA.EDU	**2LT Jason Park, USA** Department of Systems Engineering US Military Academy West Point,NY 10996 845-938-2700 X84909@USMA.EDU

We investigate the military utility of providing the capability to control the payload (known as Level III control) and/or course and altitude (Level IV) of the Sky Warrior extended range multipurpose unmanned aircraft system from the cockpit of an Apache attack helicopter. We assume the use of a point-and-click control interface, and we assume that a live video feed will be available whether or not actual control is. We quantify the savings in time that is likely to be realized by direct control as opposed to voice coordination through the Sky Warrior mission ground station by analyzing the doctrinal Apache missions and through interviews with aviation and other personnel. We then use discrete event simulation modeling to translate the savings in time to decreased probabilities of aircraft damage and increased probability of mission success.

Mapping urban cultural elements to mission planning information requirements: an ontologic approach

AbstractID: 186

Mr. Jeffrey Burkhalter, USA
US Army Engineer Research & Development Center (ERDC)
2902 Newmark Dr
Champaign,IL 61822
217-373-4462
jeffrey.a.burkhalter@usace.army.mil

Understanding the human dimension, or cultural geography, of the battlespace is a vital component to modern military operations. The increasing focus on urban operations means planners must consider the activities and behaviors of large populations of noncombatants. Research has focused on developing a geocultural analysis tool which implements the Geocultural Ontology (GCO) TM. This ontology includes the creation of an innovative framework for abstracting the geo-cultural characteristics of the urban battlespace environment, plus algorithms defining the spatial relationships between taxonomic categories contained in the framework. The GCO seeks to describe the activities of various cohorts in a spatiotemporal context; in essence “where the people are when”. Advancements in the understanding of urban cultural geography, however, must still be connected to the mission analysis component of the MDMP. Currently, planners and analysts must develop relevant data layers and visualizations based on experience or specific requests from commanders. Previously, a method was proposed to inform the Information Preparation of the Battlefield (IPB) by connecting doctrinal tasks to relevant cultural information using an ontology. The initial results of that ontological methodology, with refinements, are presented here. It is suggested as an automated method for populating decision tools used by analysts and planners with the culturally relevant information based on specific mission tasks. Furthermore, it serves as a basis for relating other data and information elements from specific geodatabases such as the Theater Geospatial Database (TGD).

Modeling Macro-Cognitive Influence on Information Sharing between Members of a Joint Team

AbstractID: 63

Dr. Steve Burnett
JIEDDO
5000 Army Pentagon
Washington,DC 20310
703-601-2392
steven.burnett@jieddo.dod.mil

Research exploring the effectiveness of joint military teams lacks the empirical robustness found in similar multicultural team research from the business domain. This research study broadens the study of effective military teams through an assessment of the factors that influence a joint team’s effectiveness by capitalizing on the business and psychological communities’ exploration of successful team performance. Specifically, in three empirical studies, this research examines several key elements of poor team effectiveness identified by the business community, namely cultural differences and personality stereotypes. Study One examined cultural orientation and service personality using a

survey instrument. The results show that cultural and personality differences exist at significant levels between the services. The second study examined team information sharing processes in a wargame environment composed of homogeneous and heterogeneous four-person teams. The results revealed that participants in heterogeneous teams, cued to the presence of cultural and personality differences among team members, performed as well as homogeneous teams. The third study expands the knowledge space of the team experiment by developing an agent-based model replicating the wargame. The model accurately represented the experimental data, confirming our hypothesis that computational models coded with actual data sets from human experimentation are more robust than models coded with notional data sets. The results demonstrate that joint team effectiveness improves by incorporating methodologies used in the business and simulation science communities.

System Functional Analysis in a Capability Mapping Framework

AbstractID: 167

Mrs. Laura J Byrd	**Mr. Jason B Shreve**
Joint Systems Integration Command (JSIC), Booz | Allen | Ham	Joint Systems Integration Command (JSIC), Booz | Allen | Ham
116 B. Lakeview Parkway	116 B. Lakeview Parkway
Suffolk,VA 23435	Suffolk,VA 23435
757-203-4595	757-203-4593
laura.byrd@jsic.jfcom.mil	jason.shreve@jfcom.mil

Providing interoperable and integrated Joint Command and Control (JC2) capabilities, through efficient acquisition and resourcing decisions, continues to be a critical challenge to the Department of Defense (DoD). To address this issue, the 2006 Quadrennial Defense Review (QDR), and subsequent direction from Deputy Secretary of Defense, established Capability Portfolio Management (CPM) as the means to efficiently resource capabilities. The Commander United States Joint Forces Command (CDRUSJFCOM) has been designated as the lead for the Command and Control Test Portfolio. He has appointed the USJFCOM J8 as the executor of day-to-day C2 CPM functions.

The Joint Forces Command Joint Systems Integration Command (JFCOM JSIC), in its support of USJFCOM J8, assumes an analytical role in the CPM process. JSIC gathers functional information on the systems within the C2 portfolio and utilizes its Capability Mapping Framework (CMF) to provide desktop level assessments of systems and the capabilities they impact. The CMF allows JSIC to determine both functional overlaps and functional gaps in the C2 Joint Capability Area (JCA), with respect to the systems in the portfolio. JSIC also uses this information to construct assessments within its lab environment to make concrete system evaluations and determine system interoperability.

This paper offers a comprehensive description of CMF metrics and methodology, specifically focusing on identification of pertinent metrics and application of the methodology in support of C2 CPM analytics. Additionally, the strengths and weaknesses of the methodology are discussed as well as possible avenues for improvement. This paper concludes by describing future work on how the process can be extended to support additional applications.

Sustainment Battle Command Research Program

AbstractID: 385

Mr. Michael F Byrd, USA	**Mr. Morris Hayes, USA**
Training and Doctrine Command Analysis Center	Training and Doctrine Command Analysis Center
401 First Street	401 First Street
Fort Lee,VA 23801	Fort Lee,VA 23831
804-765-1837	804-765-1833
DSN: 539-1837	DSN: 539-1833
FAX: 539-1260	FAX: 539-1260
michael.f.byrd@us.army.mil	morris.hayes@us.army.mil

This presentation will provide an overview of the Sustainment Battle Command (SBC) research conducted by the Training and Doctrine Command Analysis Center (TRAC). SBC is defined as the application of leadership and decision making to the planning and execution of sustainment operations in support of combat against a hostile, thinking opponent. The purpose of this two-phased research effort is to posture TRAC for future analysis of SBC, commonly referred to as logistics command and control. The intent is to conduct the basic research to define SBC in terms of knowledge, data, and algorithms. Results of this basic research will then be used to conduct detailed SBC analyses, and will also be used as a point of departure to begin an applied research effort. The focus of the applied research is to examine the developed body of knowledge to determine what and how to represent SBC in TRAC's Force-on-Force models (i.e., the Combine Arms Analysis Tool for the 21st Century (COMBATXXI) and the Advanced Warfighting (AWARS) model).

Phase I (FY07) of the research effort is complete. It focused on the basic SBC research at brigade and below (specifically, the Future Combat System Brigade Combat Team (FBCT)) and applied research with respect to COMBATXXI (TRAC's brigade and below, entity-level model). Phase II is ongoing and focuses on Echelons Above Brigade (EAB) and AWARS (TRAC's aggregate-level, Corps/Division model).

Three of TRAC's elements have worked on this project and will continue working on it. TRAC-LEE is overall lead and integrator. TRAC-MTRY is building the Logistics Battle Command (LBC) model to support future analysis of the subject. TRAC-FLVN is assisting TRAC-LEE with the basic EAB research and is leading the effort to apply that research to AWARS.

This briefing will introduce the subject matter and provide an overview of the draft results of Phase I and emerging results and the way ahead for Phase II. It will be immediately followed by a briefing on the LBC model and a briefing by TRAC-FLVN (submitted as a separate abstract) on their efforts to apply what has been developed to the AWARS model.

SOF Operational Planning Tool: a Simulation Approach

AbstractID: 126

Mr. John M Byrnes, USAF
Air Force Research Laboratory
2130 Eighth St, Bldg 45, Room 261
WPAFB,OH 45433
937-255-1416
DSN: 785-1416
FAX: 937-656-7868
John.Byrnes@WPAFB.AF.MIL

The objective is a first cut at a top down operational planning model for SOF joint missions; the goal is a broad scope turnkey model. It is to be used at the conceptual mission stage by SOF operational planners. It would be adaptable to scenarios with a variety of threats, environments and objectives. It would allow the planner to examine a number of strategies and tactics; it would support risk assessment by allow parametric case variations and assumption tests. The model includes the following attributes:
• The models logic, a graphical chain schematic (linked icons), makes it easy to understand by a user. It includes interdependent sub-missions for air, land & sea forces.
• A top level flight panel controls the primary combat assumptions to be input by the mission planner. Re-programming would not be standard practice.
• The models logic contains feed-back, time delays and probabilities. These provides realistic dynamics, time-sensitivity and possibly un-predictable (un-intended) consequences.
• The model also contains soft, usually hard to predict, but real variables (experience, training, surprise, etc.).
• A graphical construct generates the underlying simulation equations.
Finally the model isn't magic. The combat planner must know the type, amount and performance of his combat assets & logistics, and also judge the same for the threat. The output of the model is combat results (kills & expendables) and associated time to achieve (or fail) a goal. It includes an overall summary for both sides. The presentation will include a supporting data base for several scenario examples and the "run" results.

Determining the Most Influential Factors to the Severity of Casualties in Iraq Using Data From Personnel Casualty Report

AbstractID: 72

Capt Chris Cannon, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
christopher.j.canno1@usmc.mil

Capt Joseph Mlakar, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
joseph.mlakar@usmc.mil

Mr. Douglas Hoffman
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8181
DSN: 378-8181
douglas.hoffman@usmc.mil

Significant Event (SigEvent) reports from Iraq contain information regarding the circumstances of insurgent attacks and the coalition force casualties inflicted by those attacks. While the circumstances of the attack itself are described in detail in a SigEvent report, the extent/severity of the casualties sustained is not. Typically, each SigEvent simply reports the number Killed In Action (KIA) and Wounded in Action (WIA) associated with the attack; the extent of the injuries incurred by each individual KIA and WIA is omitted. For each casualty, a separate Personnel Casualty Report (PCR) is published to detail the injuries incurred by each individual KIA and WIA. Until recently, PCR files have been kept extremely close-hold and have only been used by the Marine Corps to perform basic, rudimentary counting of casualties. As we have gained access to PCR data, we have realized that PCRs contain a tremendous amount of unexploited data concerning the circumstances and severity of each casualty.

Our objective in this research is to analyze data contained in PCRs and SigEvent reports in order to determine the most influential factors to the severity of casualties in Iraq. We describe the process of transforming data contained in PCR files into a structure that is suitable for analysis and our procedure to link each PCR to the SigEvent that caused the casualty. We present some of the initial findings resulting from this ongoing research.

Soldier as a System Value Analysis

AbstractID: 22

MAJ Melanie Carlson, USA
Department of Systems Engineering, USMA
47 Winhaven Ct
Highland Falls,NY 10928
845-938-5539
melanie.carlson@usma.edu

The Soldier is the most important, capable, all-weather, deployable, employed, vulnerable, and complex combat platform in the nation's arsenal. The Soldier as a System (SaaS) concept is an integrated methodology for equipping in order to optimize Soldier effectiveness, and includes the Soldier and all those items worn, carried, or consumed. Soldiers are required to operate effectively for extended periods across the full spectrum of military operations and environmental conditions. Program Executive Office (PEO) Soldier strives to provide the best equipment to ensure the success and dominance of Soldiers. The Army wants to transition to SaaS to improve Soldier effectiveness.

However, currently Soldier equipment is funded in a piecemeal manner instead of as a holistic weapon system. Unlike the Soldier, other major weapon systems are funded as complete packages, not individual components. Indicative is the reluctance to fund items perceived as comfort items instead of viewing them as critical to the human element of the system. The value of clothing and equipment items that provide protection from adverse environmental conditions are difficult to quantify, thus at risk for under-funding. This in turn puts the Soldier as a System at risk for under-funding and diminished effectiveness. Demonstrating the impact of difficult to quantify items on Soldier performance with tangible metrics will help the holistic SaaS to compete with other major weapons systems for programmed dollars. Ultimately, the goal of this research is to establish a tangible set of objectives and metrics to use in determining the value in terms of Soldier effectiveness of such programs. This is accomplished by building a value model using Value Focused Thinking and other decision analysis concepts to assess impact on effectiveness. The model could then be used to demonstrate budgetary trade-offs in terms of capabilities of the Soldier as a System.

Quantifying the Interrelationships and Trade-offs between Capabilities and Plans: DOD's Economy of Risk

AbstractID: 156

Mr. Jonathan R Charlton
Self (Employed by Booz Allen Hamilton)
171 Bluebird Hill Road
Woodland Park,CO 80863
719-271-1149
jrcharlton@gmail.com

In the Department of Defense (DOD) and, in fact, many other organizations, the challenge of resource allocation is based in the establishment of a universal value by which investments, both in capabilities and plans, may be measured. Indeed, a capability or plan will be valued differently by different military decision-makers. This difference in valuation is based on a different set of priorities, specific to each decision maker's responsibilities. Lacking a fundamental measure of value, consistent across all military decision makers, determining the relative value of a capability or plan within DOD's portfolio of capabilities and plans is impossible.

In an effort to assist military decision makers in assessing the relative value of a DOD capability or plan within the DOD's portfolio of capabilities and plans, I have attempted to establish a common framework in which the value of all DOD capabilities and plans may be measured. This framework is based in the measurement of risk, and the consequence and likelihood factors of risk are broken down into terms that include the spectrum of conditions, capabilities, and strategies. A capability or plan can be measured in how much it decreases risk. The capacity to decrease risk, thus becomes the measure of a capability's or plan's value.

Using utility theory through the employment of logistic regression, we observe the probability of risk given conditions and capabilities. Because decreasing the probability of risk is synonymous with the decreasing of risk itself, we observe value synonymously. Doing so allows us to infer standards statistically, establishing our current level of risk, and capability. The coefficients of our logistic regressions represent weightings, or utilities of attributes that contribute, proportionately to decreasing risk, helping us make better resource allocation decisions. This presentation will explain the risk-value framework, the method of measuring the probability of risk through logistic regression, the weighting of attributes, tasks, capabilities and risk for well informed trade-off decisions, the method of determining gaps and excesses, and, furthermore, a portfolio replication method of determining the value of resource and planning decisions and strategies over time.

Adversary Process Simulation

AbstractID: 469

Mr. Charles S Chellis
Department of Defense
9800 Savage Road Ste 6329
Fort Meade,MD 20755-6329
240-373-1787
FAX: 240-373-1788
cschell@nsa.gov

Mr. Michael Gabai
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-2199
michael.r.gabai@saic.com

Mr. Garrett Carstens
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3756
garrett.t.carstens@saic.com

Cyber Intelligence Preparation of the Environment (CIPE) models the adversary's process in order to provide the commander or senior decision maker relevant, timely information about the adversary's courses of action (COAs). One way to enhance the capability of CIPE is to move towards more dynamic simulations of the adversary's process, allowing a higher level of "what if?"
and predictive analysis.

A process simulation of the adversary's terrorist recruiting process will be presented and discussed. The purpose of the model is to identify potential bottlenecks and points of failure that friendly COAs can then exploit. The simulation we developed tracks the movements and actions made by an adversary, including temporal analysis as well as probabilistic decision making resulting in possible outcomes.

Resource pools for recruiter availability and investigators for vetting potential applicants, for instance, can identify potential bottlenecks. Adjustable delays for each step in the process and selectable probabilities for path choices make the model very flexible to test typical alternative scenarios and changing conditions.

Using Cyber Intelligence Preparation of the Environment for Battle Damage Assessment

AbstractID: 475

Mr. Charles S Chellis
Department of Defense

Mr. Jeff Markey
Science Applications International Corporation

Mr. Christopher Degni
Science Applications International

9800 Savae Road, Suite 6329
Fort Meade,MD 20755
240-373-1787
FAX: 240-373-1788
cschell@nsa.gov

(SAIC)
7120 Columbia Gateway Drive
Columbia,MD 21046
410-872-2727
FAX: 410-872-1300
jeffrey.p.markey@saic.com

Corporation (SAIC)
7120 Columbia Gateway Drive
Columbia ,MD 21046
410-312-3756
FAX: 410-872-1355
degnic@saic.com

Battle Damage Assessment (BDA) is the timely and accurate estimate of damage resulting from the application of military force against an identified target. A Cyber BDA typically focuses on the effects of a computer network attack (CNA). Cyber Intelligence Preparation of the Environment (CIPE) is a methodology that focuses on the adversary's cyber processes to provide the decision maker with an assessment of the adversary. However, the CIPE framework can also augment a traditional BDA by visually outlining changes in the adversary's tactics, techniques, and procedures. This presentation details the methodology, process, and results from applying CIPE to BDA.

Critical Capability Analysis for Information Operations

AbstractID: 481

Mr. Charles Chellis
Department of Defense
9800 Savage Road, Suite 6329
Fort Meade,MD 20755-6329
240-373-1787
FAX: 240-373-1788
cschell@nsa.gov

Mr. Christopher Voxakis
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3744
christopher.a.voxakis@saic.com

Mr. William Ridings
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-2120
william.v.ridings@saic.com

Dr. Christopher Degni
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3756
degnic@saic.com

Critical capability analysis is used to identify, organize, analyze and understand the critical capabilities, requirements, and vulnerabilities of an adversary and the adversary's processes. The translation of critical capability identification and analysis from traditional military doctrine to the field of Information Operations (IO) must account for several nuances. In developing an IO versio of critical capabilities analysis, not only was traditional center of gravity (COG) analysis considered, but also newer forms of COG analysis, such as that applied to counterinsurgencies. A step-by-step discussion will be presented on the development and application of the IO critical capability methodology to a cyber problem area, including the unique challenges and successes encountered in this real-world application.

Modeling & Simulation Community of Interest

AbstractID: 322

Mr. Jesse Citizen, OSD
DoD Modeling and Simulation Coordination Office
1901 North Beauregard Street - Suite 500
Alexandria,VA 22311
703-998-0667
jesse.citizen@osd.mil

Mr. Terence Peterson, OSD
DoD Modeling and Simulation Coordination Office
1901 North Beauregard Street - Suite 500
Alexandria,VA 22311
703-998-0660
terence.peterson.ctr@osd.mil

Since its formal reorganization on October 27, 2006, the Department of Defense (DOD) Modeling and Simulation Coordination Office (M&S CO) has served as the secretariat for the also transformed DoD M&S Management System. The M&S Management System is governed by the flag-officer level M&S Steering Committee (M&S SC) with a colonel level M&S Integrated Process team (M&S IPT). Mr. Jesse Citizen is the Director, M&S CO and Colonel Michael Sanders, USA is the deputy director.

As part of its duties as secretariat, the M&S CO recently oversaw the revision and publication of DoD Directive 5000.59 on M&S Management and the DoD M&S Strategic Vision and Goals that was signed by the members of the M&S SC. The M&S CO remains under the management of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), but its new purpose came with a move from the Office of the Deputy Under Secretary of Defense for Science and Technology to the Office of the Director for Plans and Programs, both within the Office of Director for Defense Research and Engineering. Mr. Alan R. Shaffer is the Director for Plans and Programs.

M&S CO will assist the M&S SC in addressing 3 critical areas—reports due to Congress detailing the Departments M&S activities; on-going

governance and policy development; and the management of program dollars for FY09 and beyond. The M&S CO is seeking to solidify and enhance the M&S SC's current outreach approach to other federal departments and agencies, academia, and industry. The proposed briefing will address the M&S CO's road map to achieve the goals of the M&S SC.

Operations Research and the Defeat of IEDs

AbstractID: 414

Mr. Kenneth Comer
JIEDDO
5000 Army Pentagon`
Washington,DC 20310
703-602-4747
FAX: 703-426-0821
kenneth.comer@jieddo.dod.mil

The Improvised Explosive Device is the current 'weapon of choice' for US adversaries. An elaborate, enterprise-wide response has emerged within the Department of Defense, including a broad spectrum of material and non-material solutions. In support of this, the Joint IED Defeat Organization has created an "Operations Research Systems Analysis" division -- a unique component among DoD staffs and offices. This presentation (by the chief of JIEDDO ORSA division) will describe the uses of operations research in the IED fight -- to guide operations, to assess systems effectiveness, to adopt new models and analytic techniques, and much more. Regardless of the status of the IED fight, the analytic battle is just beginning.

Operating and Support (O&S) Trends and Current Issues

AbstractID: 119

Mr. Walt Cooper, OSD
Office, Secretary of Defense
1800 DEFENSE Pentagon Room BE 798
Washington,DC 20301
703-697-4312
walt.cooper@osd.mil

O&S costs represent by far the largest element of a system's life cycle cost. O&S costs have historically averaged between 60 and 70% of life cycle costs, depending on the type of system. This presentation will address several developments related to this segment of life cycle costs.

Collection of contractor costs. Historically, the military departments have relied on organic support of weapon systems. In recent years, the departments have shifted sustainment responsibility to industry for many systems, most notably aviation programs. Current O&S cost collection systems do not capture the details of costs borne by contractors in sustainment arrangements, and an important initiative is underway to develop formats and procedures for reporting these costs.

Life cycle sustainment outcome metrics. The Joint Requirements Oversight Council established the Materiel Readiness/Sustainment Key Performance Parameter (KPP) in July 2006. This mandatory KPP includes Ownership Cost as a Key System Attribute. Programs must now plan to maintain traceability of costs incurred to estimates, and must plan for evaluation.

Fully burdened costs of fuel. Reducing demand for energy can provide operational forces with more flexibility and make them less infrastructure-dependent. Unfortunately, the acquisition process undervalues technologies that can improve energy efficiency. A methodology for the calculation of the fully burdened cost of fuel has been developed, and testing of this methodology has begun.

Test data. The Directorate, Operational Test and Evaluation has recently proposed the integration of actual reliability, availability and maintainability data from operational tests into the departments' O&S data systems. This initiative promises analysts with ready access to relevant test data that can be used to develop estimates of O&S costs.

Visibility and Management of Operating and Support Costs (VAMOSC). The department established VAMOSC almost thirty years ago, in the wake of alarming growth in the costs to operate and support its major weapon systems. VAMOSC has become the primary source of data for developing estimates of O&S costs and addressing other O&S-related issues. Each military department has established a VAMOSC system, tailored to meet internal decision-making and analytical requirements.

Transforming the Army Rapid Fielding Initiative

AbstractID: 32

MAJ Scott T Crino, USA
United States Military Academy
155C Gardiner Lp
West Point,NY 10996
845-938-2788
DSN: 688-2788
FAX: 845-938-5919
Scott.Crino@usma.edu

The Army's Rapid Fielding Initiative (RFI) is the process by which new equipment is distributed to Soldiers either at home station or in a theater of operations. Currently, equipment is shipped from over 50 suppliers around the United States to a single central warehouse on the east coast where it is packaged into sets. The sets are then shipped to the end user stationed at one of over 40 locations around the world. It is a process that costs the Army time, money and a great deal of effort to execute.

This case study examines the RFI supply chain and makes recommendations to improve the current inventory management system (IMS) by removing the communication gaps between the PM, warehouse and suppliers; a location analysis is performed to select the most efficient and economic location for the warehouse and packaging facility; and, a new tariff is proposed that will reduce the number of items shipped to and returned from each fielding location that better meets the needs of the Soldier. The recommendations are the result of applying a combination of Lean methodologies and the Systems Decision Process to determine the most efficient and economic solutions and provide the greatest value to the Army.

High Performance Computer Power to Support Campaign Analysis

AbstractID: 90

Dr. LTC John Crino, OSD OSD(PA&E) SAC 1401 Wilson Blvd, Suite 300 Arlington,VA 22209 703-696-9360x3313 FAX: 703-696-9394 john.crino@osd.mil	**Mr. "Boots" Barnes, OSD** OSD(PA&E) SAC 1401 Wilson Blvd, Suite 300 Arlington,VA 22209 703-696-9360x3329 FAX: 703-696-9394 steven.barnes.ctr@osd.mil

The High Performance Computing Modernization Program (HPCMP) was initiated in 1992 in response to congressional direction to modernize the Department of Defense (DoD) laboratories' high performance computing (HPC) capabilities. The HPCMP provides the supercomputer services, high-speed network communications, and computational science expertise that enables the Defense laboratories and test centers to conduct a wide range of focused research, development, and test activities. One of the primary missions of the HPCMP is to support analysis to include campaign level analysis in support of DoD Analytic Agenda.
In partnership with the OSD(AT&L) HPC Modernization Office (HPCMO) and OSD(PA&E) an award was established to provide servers for running Campaign Level simulations such as JAS, STORM, EADSIM and AMP/MIDAS. The OSD(PA&E) HPC servers with clusters of Windows and Linux processors and large disk storage capability support collaborative analysis between DoD study partners at minimal or no cost to the user. This approach allows for DoD study partners to work with common data sets under the JADM Steering Committee oversight and in support of the Analytic Baseline analysis work.
Over the past 3 years, OSD(PA&E) and JFCOM J9 have been successfully collaboratively working on common HPC platforms via SIPRNET and SDREN. Scenarios like the MCO-1 SD 2012 Sea Basing, Pegasus and Unified Engagement 06 were built collaboratively with analyst in Norfolk and DC while working at their desk. With newer HPC resources, the movement is to new the most recent technology both on the classified (PA&E servers) and unclassified (JFCOM J9) level
OSD(PA&E) invites study partners to understand the capabilities of the most recently purchased and established High Performance Computer center with the details of the capability. As a Study Partner, your DoD agency will reap benefits without expending tremendous initial and re-occurring cost of purchasing server equipment. This presentation will provide insights as to the benefits of collaborative analysis on HPC resources.

Conventional Combat - 2 (Long Range) Study

AbstractID: 282

LTC John Crino, USA OSD PA&E Simulation & Analysis Center 1401 Wilson Blvd Arlington,VA 22209 703-696-9360 john.crino@osd.mil	**Ms. Susan Hanson** The MITRE Corporation 7515 Colshire Dr McLean ,VA 22102 703-983-1910 shanson@mitre.org	**Mr. Keith McCready** CACI 1600 Wilson Blvd Arlington,VA 22209 703-696-9360 kmccready@caci.com
Ms. Angela Hunter Northrop Grumman 7575 Colshire Dr McLean,VA 22102 703-696-9360 angela.hunter.ctr@pae.osd.mil	**Mr. Michael Poumade** Northrop Grumman 7575 Colshire Dr McLean,VA 22102 703-696-9360 michael.poumade.ctr@pae.osd.mil	**Mr. Chuck Burdick** Lockheed Martin 1401 Wilson Blvd Arlington,VA 22209 703-696-9360 chuck.burdick@lmco.com

The Simulation and Analysis Center (SAC) has been directed to undertake a new effort to model the CC-2 Long Range Study in the Joint Analysis System (JAS) model. This resulting study will leverage the previous SAC analytical efforts, performed using a suite of mission and campaign level models and wargames. The JAS scenario will synchronize the inputs and assumptions from the previous efforts to generate a consolidated CC-2 Simulation, and go further to include stochastic ISR and perception, dynamic CONOPs, I&W, responsive command and control, communications routing, and unconventional warfare effects.

This briefing will address the analysis of key study objectives, including measuring Red and Blue attrition, TBM and cruise missile defense capability, ISR effectiveness in locating, identifying and tracking critical events and targets, achieving and maintaining Air and Maritime superiority, measuring the ability to project power into denied regions, supporting the force with mobility and logistics, and understanding the success of primary or alternate CONOPs.

Fleet Material Readiness Assessment

AbstractID: 58

Mr. Carlos F Cruz
Naval Surface Warefare Center, Corona Division (NAVSEA)
2300 FIFTH STREET
NORCO ,CA 92860
951-273-4793
DSN: 933-4793
FAX: 951-273-5357
carlos.f.cruz@navy.mil

PEOs, NAVSEA, and the Fleet have a common process to measure, assess, and arrive at solutions to material readiness and cost issues for shipboard systems. The programs that form the process foundation are the Material Readiness Database (MRDB) and the Troubled Systems Process (TSP). The programs are part of the Material Readiness Assessment Department at the Naval Surface Warfare Center (NSWC), Corona division. Corona serves as the Navy's combat, weapons, and warfare system's performance and material readiness independent assessment agent. By utilizing the approved process, PMs have been able to assess achieved Reliability, Maintainability, and Availability (RM&A) and compare it to requirements in order to identify and correct design, sparing, training, & maintenance issues. In addition, the effectiveness of corrective actions can be assessed using actual Fleet data.

The MRDB is chartered by OPNAV to serve as the authoritative source of in-service readiness measures, trends, cost, and part drivers (cost, maintenance, reliability, and maintainability). It's primary metric is Operational Availability (Ao), which the CNO established as the primary measure of material readiness for Navy mission essential systems. Other metrics provided include Mean Time Between Failure (MTBF), Mean Time To Repair (MTTR), and Mean Logistics Delay Time (MLDT). Readiness computations are in accordance with OPNAVINST 3000.12A and other accepted standards.

The CNO directed TSP program is used to analyze readiness characteristics of all shipboard systems from a Fleet maintenance perspective. TSP is sponsored by OPNAV and jointly managed by FFC and TYCOM Maintenance Officers. It encompasses all shipboard systems on all Navy platforms and provides feedback from Fleet PMs on equipment maintenance issues. The TSP identifies Navy-wide "troubled systems" and problems for corrective measures. Troubled systems are then passed to the MRDB for root cause assessment for identification and prioritization of the right fix at the right cost for right readiness.

Virtual Autonomous Navigation Environment Simulation Testbed

AbstractID: 524

Mr. Christopher L Cummins, USA
U. S. Army ERDC
3909 Halls Ferry Road
Vicksburg,MS 39180-6199
601-634-3989
FAX: 601-634-3068
christopher.l.cummins@erdc.usace.army.mil

This presentation will describe the simulation framework for the Virtual Autonomous Navigation Environment (VANE). The VANE will facilitate virtual testing of unmanned systems for evaluation of autonomous navigation systems and their associated hardware/software subsystems. The research is using mature, new, and emerging technologies to advance a physics-based, terrain-enriched, virtual environment for ground vehicle and terrain interactions based on sensor perceptions. This virtual environment will supplement field evaluations at a reduced cost and with better control and repeatability than can be obtained from physical testing. This presentation is an overview of the approach for developing the VANE Simulation Testbed.

IRR-TPU Affiliation Study

AbstractID: 397

Mr. Alan R Cunningham, USA
US Army TRADOC Analysis Center - Fort Lee
401 FIRST STREET, SUITE 401
Fort Lee,VA 23801-1511
804-765-1830
DSN: 539-1830
FAX: 804-765-1456
alan.cunningham@us.army.mil

MAJ Hans G Barkey, USA
US Army TRADOC Analysis Center - Fort Lee
401 FIRST STREET, SUITE 401
Fort Lee,VA 23801-1511
804-765-1818
DSN: 539-1818
FAX: 804-765-1456
hans.g.barkey@us.army.mil

Ms. Amy McGrath, USA
US Army TRADOC Analysis Center - Fort Lee
401 FIRST STREET, SUITE 401
Fort Lee,VA 23801-1511
804-765-1827
DSN: 539-1827
FAX: 804-765-1456
amy.mcgrath@us.army.mil

This presentation will provide an overview of the Individual Ready Reserve – Troup Program Unit Affiliation Study. The effort focuses on training of IRR soldiers to improve readiness for mobilization, if required, under the Army Force Generation (ARFORGEN) process. Emerging results as of the end of May 2008 will also be presented.

The study purpose is to identify ways to enhance IRR accountability, and IRR to TPU accession processes to ensure Army resources are applied to the best alternatives for building and maintaining a fully trained force under ARFORGEN. The results of this study may be used to underpin decisions regarding funding levels of an IRR to TPU affiliation program to support ongoing Program Objective Memorandum (POM)

refinements, Future Years Defense Plan (FYDP), and Joint Capabilities Integration and Development System (JCIDS) processes.

Focus of the analysis is on Soldiers in the IRR and leaving Active Duty with a remaining Army Reserve (AR) obligation. The team plans to analyze results of interviews and surveys done at transition points as Soldiers are transferred to the IRR and surveys of Soldiers in the IRR. This analysis will determine if a test of the concept is warranted and whether it will likely produce the desired effects. It will also determine the conditions that are most likely to be accepted by the Soldiers, as well as any additional considerations for an IRR-TPU Affiliation program.

Army Reserve Educational Assistance Study

AbstractID: 398

Mr. Alan R Cunningham, USA	**Mr. Drew Cherry, USA**	**Ms. Amy R McGrath, USA**
US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1830 DSN: 539-1830 FAX: 804-765-1456 alan.cunningham@us.army.mil	US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1812 DSN: 539-1812 FAX: 804-765-1456 drew.cherry@us.army.mil	US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1827 DSN: 539-1827 FAX: 804-765-1456 amy.mcgrath@us.army.mil

This presentation will constitute an overview of the Army Reserve (AR) Educational Assistance (EA) Study, with a focus on AR Soldiers in the Selected Reserve and AR prospects who would benefit from AR EA program.

The study purpose is to determine the best level and allocation of Educational Assistance (EA) funds to increase the Army Reserve (AR) end strength. The results of this study may be used to underpin decisions regarding funding levels of the EA program, and to complement the body of analytic work being done at Headquarters Department of the Army (HQDA) to support ongoing Program Objective Memorandum (POM) refinements, Future Years Defense Plan (FYDP), and Joint Capabilities Integration and Development System (JCIDS) processes.

The primary objective is to identify how EA funds are currently being spent, and to determine if AR end strength will increase from different allocations of funds or increases in expenditures. The analysis will rely upon interviews and surveys of AR Soldiers. This analysis will determine the best way to provide EA to AR Soldiers, and identify benefits and incentives that are most likely to lead to increases in AR end strength.

CS-CSS Unit Integration into ARFORGEN

AbstractID: 400

Mr. Alan R Cunningham, USA	**Mr. Mark P Schairbaum, USA**	**Mr. Kevin Keaveney**
US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1830 DSN: 539-1830 FAX: 804-765-1456 alan.cunningham@us.army.mil	US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-2597 DSN: 539-2597 FAX: 804-765-1456 mark.schairbaum@us.army.mil	K2 Global Solutions 1301 S Joyce St Apt 4201 Arlington,VA 22202 678-575-5789 kevin.keaveney@us.army.mil

This presentation is an overview of the current state of integration of Combat Support (CS) and Combat Service Support (CSS) units into the Army Force Generation (ARFORGEN) process with a focus on comparing training impacts under the current 5-year Army Reserve (AR) Training Strategy (ARTS).

This study was conducted on behalf of the Office of the Chief of the Army Reserve – Program, Analysis, and Evaluation (OCAR-PAE). Its purpose was to review the AR 5-year training strategy for the year 2011 while evaluating impacts on resources and on the availability of AR forces to Combatant Commanders under the ARFORGEN concept. A combination of significant structural and doctrinal transformation in the AR, as well as force requirements in ongoing real-world operations and continued need for improved Total Army Integration, prompted this study of the ability of training strategies and resources to provide trained and validated CS and CSS forces to the Combatant Commander.

TRAC-LEE worked primarily with US Army Reserve Command (USARC) and TRADOC subject matter experts (SMEs) to collect data and contextual information on current AR Expeditionary Packages (AREP), training strategies, training histories, and mobilization processes required for CS and CSS units. The analysis compared elements of training strategies, assessed differential impacts on the training capability, determined the comparative advantages of each training strategy, and provided a rough framework for upcoming TAA cost decision tradeoffs.

Army Reserve Accession and Retention Analysis

AbstractID: 401

Mr. Alan R Cunningham, USA	**MAJ Portia J Benson, USA**	**Ms. Amy R McGrath, USA**
US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1830 DSN: 539-1830 FAX: 804-765-1456	US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1854 DSN: 539-1854	US Army TRADOC Analysis Center - Fort Lee 401 FIRST STREET, SUITE 401 Fort Lee,VA 23801-1511 804-765-1827 DSN: 539-1827

alan.cunningham@us.army.mil	FAX: 804-765-1456 portia.benson@us.army.mil	FAX: 804-765-1456 amy.mcgrath@us.army.mil

Ms. Maura Keller
K2 Global Solutions
115 Helena Court
Fayetteville,GA 30215
678-478-7119
maura.keller@us.army.mil

This presentation will provide an overview of the Army Reserve Accessions and Retention Analysis (ARARA), with a focus on Army Reserve (AR) enlisted Soldiers.

The ARARA was conducted on behalf of the Office of the Chief of the Army Reserve – Program, Analysis, and Evaluation (OCAR-PAE). Its purpose was to inform more efficient budgeting decisions, and to ensure that AR resources were applied to the best alternative for building and maintaining a fully manned force under the Army Force Generation (ARFORGEN) Model. Additionally, the analysis sought to determine possible non-monetary recruiting and retention incentives versus monetary incentives. The results of this analysis provided an indication of long term requirements for the AR to fill and maintain a ready force.

The focus of the analysis was on first term AR enlisted (E5 and below) and company grade officers (O3 and below). The team analyzed demographic data on Soldiers leaving the AR and compared it to the AR population for departures since 2001. The analysis relied upon interviews and surveys of Soldiers from all components to determine those incentives that provided the best retention or accession benefits to join the AR.

Electronic Warfare Integration on the IO Range

AbstractID: 280

Mr. Thomas Curby-Lucier
USJFCOM IO Range
700 N St Mary's St Ste 700
San Antonio,TX 78205
210-977-5793
thomas.curby-lucier.ctr@jiowc.osis.gov

LTC Scott Bisciotti, USA
USJFCOM IO Range
116 Lake View Parkway
Suffolk,VA 23435
757-203-5962
scott.bisciotti@jfcom.mil

The USJFCOM IO Range is in the process of integrating EW on its closed loop network range. This integration will require bringing EW specific M&S, low risk open air jamming effects, and EW visualization. It will also demonstrate how IO Range can be a venue for integration of EW with CNO capabilities which will improve Blue Force ability to control the electromagnetic spectrum in a congested and a contested environment.
The IO Range is begining this EW integration with some proposed proofs of concept for FY08 which include support to USPACOM and the National Training Center MRX's.

Regional Maritime Domain Awareness Capability (RMAC) Technical Demonstration (TD-1) Results

AbstractID: 274

Mr. Eduardo D Danganan, USN
NAVAIR Warfare Analysis and Integration Department 4.10.1.3
48110 Shaw Road
Patuxent River ,MD 20670
301-342-8282
eduardo.danganan@navy.mil

Mr. Stuart Brown
NAVAIR Warfare Analysis and Integration Department 4.10.1.2
48110 Shaw Road
Pautxent River,MD 20670
301-342-8307
stuart.brown@navy.mil

Maritime Domain Awareness (MDA) is the capability to observe and anticipate threats that occur in the worlds oceans in order to “neutralize threats to US national security interests.” However maritime safety is also the concern of other nations that share the world’s oceans for commerce and other activities.

The Regional Maritime Domain Awareness Capability (RMAC) is an OSD Joint Common Technical Demonstration (JCTD) program that addresses this need for any country to develop an MDA capability. The first demonstration of this initiative is in the Gulf of Guinea (GoG). The Gulf of Guinea has become an important region of commerce for which the need for maritime security and awareness is necessary to ensure the safety of commercial activities, by coastal states, from current and future threats. The RMAC, envisioned to be a network or partner countries sharing maritime intelligence, will be able to build and maintain maritime security and surveillance operations in the Gulf of Guinea. This is achieved through maritime awareness by having the capability to conduct maritime surveillance, tracking, and identification by using commercial off the shelf systems (COTS).

An RMAC Technical Demonstration Initiative (TD-1) was conducted to show that these COTS systems can enable potential partner countries that had no prior maritime safety operations to achieve maritime awareness in a short time. The TD-1 was composed of several scenarios that reflect common maritime threats that are common in the Gulf of Guinea.

The purpose of this study is to show that MDA can be achieved with the netted sensors and display systems used in the test. These systems were able to collect ship traffic data, transmit the data for processing and displayed information to enable actionable decision making when necessary. It also describes the defined Measure of Performance (MOP) metrics, post test analysis, and operational insights derived from the test. It describes how these systems, combined with operational procedures or Concept of Operations (CONOPs) unique to each country will

enable these partner countries achieve an MDA capability.

A Cross Disciplinary Approach to Planning of Psychological Operations

AbstractID: 164

Mr. Lothar W Deil, USAF	**1st. Lt Ryan Hemperly, USAF**
453 Electronic Wafare Squadron	453 Electronic Warfare Squadron
102 Hall Blvd, STE 333	102 Hall Blvd, STE 333
San Antonio,TX 78243-7078	San Antonio,TX 78243-7078
210-977-2427	210-977-2427
DSN: 969-2427	DSN: 969-2427
lothar.deil@lackland.af.mil	ryan.hemperly@lackland.af.mil

Combining existing Radio Propagation Tools with Geospatial Analysis Tools provides new capabilities for the PSYOP Planner. 453 Electronic Warfare Squadron, with USSTRATCOM sponsorship, combined components of their existing radio propagation modeling tool (IMOM Engineer) with geospatial analysis components in the Commercial Joint Mapping ToolKit (CJMTK) to provide PSYOP mission planners new metrics to determine their operational effectiveness. The tool combines demographic metrics (such as population density, sex, age, affiliation, language, etc.) with radio frequency coverage to provide a more accurate representation of the target audience. The same functionality extends to the evaluation of potential collateral targets allowing mission planners new insights to the full impact of their operations.

Organizing an Information Age Combat Force

AbstractID: 441

LTC Sean Deller, USA
CARD, ARCIC, TRADOC
114 Thomas Street
Smithfield,VA 23430
757-788-4324
DSN: 680
sean.deller@us.army.mil

The nature of warfare is changing as we move from the Industrial Age to the Information Age. While the exact nature of the ongoing and impending changes to warfare is still the subject of an open and lively debate, there is a consensus that the legacy approaches and solutions to the organization and management of military forces are becoming increasingly inadequate, particularly concerning the number of quantifiable metrics with which to evaluate network performance and enable value propositions. The purpose of this research is to test the theory of distributed networked operations (Cares, 2004) by employing an agent-based model to compare the organization of a combat force (as represented in the Information Age Combat Model) with its effectiveness in combat. The desired result is to identify the network performance metrics that are most useful in enabling a value proposition between different Information Age combat force organizations, and what the optimal values of these metrics should be.

Forecasting Officer Commissions for the United States Army Cadet Command (Senior Reserve Officer Training Corps (ROTC))

AbstractID: 545

MAJ Vaughn D DeLong, USA	**LTC Paul L Webber, USA**
Department of Mathematical Sciences, USMA	U.S. Army Cadet Command
646 Swift Road	55 Patch Road; Building 56
West Point,NY 10996	Fort Monroe,VA 23651
845-938-2270	757-788-4606
DSN: 680-2270	DSN: 688-4606
FAX: 845-938-2409	paul.webber@usacc.army.mil
vaughn.delong@usma.edu	

The United States Army Cadet Command is responsible for commissioning the majority of officers in today's Army. The Command untilizes a weighted forecasting model to predict officer commissions for each fiscal year or mission set. The commission forecast report model predicts the number of commissions for the Command and each respective ROTC brigade within the Command for the current mission set (MS 2008) and the next mission set (MS 2009). Utilizing historical data and monthly data observations from internal database processing systems, the model enables Senior ROTC leaders to assess their school commissioning programs with respect to mission goals based on total contracted cadets enrolled in program for each respective mission set.

Commander Air Force Forces (COMAFFOR) Assessment

AbstractID: 189

Lt. Col. David R Denhard, USAF	**Lt. Col. Richard Bullock, USAF**

13 AF/A9
650 Hangar Ave.
Hickam AFB,HI 96701
808-449-0464
DSN: 315-449-0464
FAX: 808-449-0448
david.denhard@hickam.af.mil

13 AF/A9
650 Hangar Ave.
Hickam AFB,HI 96701
808-449-0946
DSN: 315-449-0946
FAX: 808-449-0448
richard.bullock@hickam.af.mil

Effects-based assessment has come of age in both the joint and Air Force communities. From the joint air perspective, the Joint Force Air Component Commander (JFACC) plans, executes, and assesses effects in the air, space, and cyberspace domain. What has received less attention in the past is an assessment of the Commander Air Force Forces (COMAFFOR) ability to provide capability to the JFACC for employment in support of the Joint Force Commander. This presentation highlights a methodology developed by 13th Air Force to provide the COMAFFOR feedback on the status of forces and the operational impact due to changes in the status. The methodology was developed using a capability supply/demand framework viewing COMAFFOR capability through campaign objective performance, and basing frames of reference. The methodology has evolved through implementation in various USPACOM exercises and outlines the nuances of assessing humanitarian assistance and disaster relief (HADR) operations versus assessment of combat operations.

Spectral Methods for Network Analysis

AbstractID: 372

Mr. Daniel Derendinger, USA
US Army TRADOC Analysis Center - Fort Leavenworth
255 Sedgwick Avenue
Fort Leavenworth,KS 66027-2345
913-684-7567
DSN: 552
FAX: 913-684-7589
Daniel.derendinger@us.army.mil

Mr. Michael S Cox, USA
US Army TRADOC Analysis Center - Fort Leavenworth
255 Sedgwick Avenue
Fort Leavenworth,KS 66027-2345
913-684-5759
DSN: 552
FAX: 913-684-9232
Michael.Scott.Cox@us.army.mil

This paper presents a set of metrics for communication network that are based on spectral graph theory. These metrics provide bases by which to compare different network topologies and are not concerned with specific details of the network such as communication devices, redundancy of links, or spatial distribution of communication nodes. Spectral methods use local relational network data to give a picture of the global topology of the network.

Exact analysis of large military communication networks involves large amounts of data and prohibitively long computation times. For this reason, a set of metrics that can provide a reasonable picture of a network based on minimal data has value as an analytical tool. The purpose of this paper is to present several spectral graph-theoretic metrics that may be applicable to the analysis of communication networks. These metrics - algebraic connectivity, accessibility, diameter, and node betweenness - allow for the analysis of a network at a relatively high level of abstraction. Details of the network such as individual communication devices, redundancy of links, and spatial distribution of communication nodes are not taken into account. The analysis is instead concerned with the overall topology of the network and provides bases for the comparison of different network configurations. This paper is the result of a literature review conducted as an initial investigation into the suitability of spectral metrics for military communication networks, and is not meant to be comprehensive.

Two of the four metrics (algebraic connectivity and accessibility) have been implemented in a tool to investigate the application in network analysis.

Using Measures and Data Within a New Planning Process for Resource Apportionment

AbstractID: 17

Dr. Joe DiRenzo III, USCG
Coast Guard Atlantic Area
431 Crawford Street
Portsmouth,VA 23704
757-398-6695
joseph.direnzo@uscg.mil

LT Fred Bertsch, USCG
Coast Guard Atlantic Area
431 Crawford Street
Portsmouth,VA 23704
757-398-6536
Fred.S.Bertsch@uscg.mil

The development of a new standardized operational planning process throughout the Coast Guard, and the implementation of effects based operations throughout Coast Guard Atlantic Area (Operational Commander all states east of the Rockies and the Caribbean) have provided a catalyst for the service making better informed resource apportionment decisions based upon data and their associated measures. The challenge inherent within the process is one that has faced the Coast Guard for numerous years: developing appropriate measures for use in decision making and understanding the impact of resources on them. The Coast Guard's multiple missions are often overlapping and continuous in nature creating interaction between them which also results in competition for resources. Similarly, the service's assets complete numerous tasks, many of which may affect multiple missions and outcomes simultaneously. While the new planning process provides greater visibility on data and measures, without proper interpretation and analysis of the information, the Coast Guard will not effectively employ its assets to accomplish the missions. To understand and properly employ this information for planning and resource apportionment, Atlantic Area is relying upon an effects based approach to operations and developing measures that relate not only to performance by assets but to the effects that are desired, in full integration of all elements of national power. While still in preliminary development, this approach assists in understanding the interaction between accomplishment of tasks and completion of desired effects as well as outside effects and influences. By incorporating this approach into the Coast Guard's new Standard Operational Planning Process, mission analysis and performance assessment will provide decision makers with better information to apportion resources at the Strategic, Operational, and Tactical level.

Beyond resource apportionment though, the process will use these measures and the associated data to inform the budgetary process, the support process, and contingency planning. As a result, the Coast Guard will not only make better informed resource decisions for current operations, but also for future operations, all resulting in improved performance and return on investment for the American Public.

Efficient Design of Experiments Application to Analysis of Notional Obscurant Artillery Round Effectiveness

AbstractID: 273

Dr. Thomas A Donnelly
AMSRD-ECB-RT-IM
5183 Blackhawk Rd., Bldg. E5951
Aberdeen Proving Ground,MD 21010-5424
410-436-2571
DSN: 584
FAX: 410-436-2165
thomas.a.donnelly@us.army.mil

Dr. Roger Davis
OptiMetrics, Inc.
100 Walter Ward Boulevard
Abingdon,MD 21009
410-569-6081
FAX: 410-569-6083
rdavis@optimetrics.org

Mr. John Walstrum
OptiMetrics, Inc.
100 Walter Ward Boulevard
Abingdon,MD 21009
410-569-6081
FAX: 410-569-6083
jwalstrum@optimetrics.org

Mr. William Rouse
OptiMetrics, Inc.
100 Walter Ward Boulevard
Abingdon,MD 21009
410-569-6081
FAX: 410-569-6083
wrouse@optimetrics.org

The U.S. Army is conducting an investigative study on new materials for use as bi-spectral obscurants in artillery rounds. The program objective is to extend current visible and near infrared obscurant capability to include the mid and far infrared spectral regions. Modeling and simulation is used to aid in the evaluation of proposed new materials. Modeled parameters include; obscurant material (3 types), dissemination techniques (12 combinations), meteorological conditions (4 combinations), and observer-cloud-target geometries (2). There are 288 possible combinations of variable settings.

Evaluation criteria include obscurant attenuation levels, effective obscurant coverage, and obscurant duration on target area as well as measures of variation of these responses. Setting up each simulation run and the subsequent data reduction and analysis requires significant time and human resources.

To reduce these requirements a sequential Design of Experiments approach was used to get the most information from the fewest simulation runs. Each succeeding stage of trials was first used as checkpoints of the current simpler model before being used to fit a more complex model of the process. The sequential analysis was also used to learn when the addition of more trials no longer improved prediction accuracy and therefore when to stop adding trials and minimize costs.

Four stages of trials of sizes 18, 18, 36 and 18 were run. Trials in the first two stages were chosen to support analysis of the main effects for each factor. Trials in the third stage were chosen so that when combined with the first two stages, the combined 72 trials (25% of the 288 possible runs) could support a model that included all possible two-way interactions among the factors. It will be shown how the application of the principles of “factor sparsity” and “effect heredity” yields a model that predicts nearly as well using just the first 36 trials.

Multicast of Critical Information in a Mobile Ad-Hoc Network Using Swarm Intelligence

AbstractID: 316

Mr. David Dorsey
Drexel University
ECE Department Data Fusion Lab Bossone Room 324 31
Philadelphia,PA 19104
215-895-1740
FAX: 215-895-1695
dave@minerva.ece.drexel.edu

Mr. Chris Gaughan
US Army RDECOM Edgewood Chemical Biological Center
5183 BLACKHAWK RD AMSRD-ECB-RT-IM E5951
APG-EA,MD 21010-5424
410-436-5560
FAX: 410-436-2165
chris.gaughan@us.army.mil

As described in the Transformational Countermeasure Technologies Initiative (TCTI) Implementation Strategy, a primary goal for the U.S. military is to provide future Warfighters a seamless net-centric environment, distributing critical information from embedded sensors and combining and processing these data within the environment in order to provide a comprehensive view of the battlefield and emerging threats. Information from these mobile ad-hoc networks (MANETs) will be integrated with data from drones, satellite, and Future Combat Systems platforms to allow quick mission changes and actuator responses.

An important challenge is the problem of multicasting and broadcasting messages in these heterogeneous networks. In many situations, a node does not need to communicate with a specific destination, but wishes to send a message, such as an alarm, to the entire network or a subset of nodes in the network. Messages should be reliably delivered in a timely manner to many nodes in a large scale deployment without flooding the network with redundant messages and wasting limited energy.

Swarm intelligence is a framework for designing robust, distributed, self-organizing systems composed of many interacting individuals, each following a simple set of rules. It is based on the principles underlying the behavior of natural systems. The approach emphasizes distributed solutions to problems, interactions among relatively simple agents, flexibility, and robustness. This method is particularly useful for complex communication and control systems where the designer cannot a priori predict all possible network configurations, failure modes, and other problems with which a system may be confronted.

We propose a protocol and framework for efficiently disseminating information in dynamic, large-scale networks including both mobile nodes

and stationary sensors. Our technique involves the use of mobile software agents that pick up and/or drop off data to nodes according to a local utility function. Agents make decisions about which data to pick up and which node to migrate to according to an expected marginal cost function, relying only on local information recorded onto the nodes by other agents. We aim to demonstrate that this method of disseminating information in dynamic networks shows an improvement over similar techniques used for efficient broadcasting.

End to End Distribution and Warfight Modeling

AbstractID: 278

Ms. Andrea Drabek	**Ms. Holynne Steppe**
USTRANSCOM	USTRANSCOM
704 Ward Dr	704 Ward Dr
Scott AFB,IL 62225	Scott AFB,IL 62225
618-220-5133	618-220-5142
andrea.drabek.ctr@ustranscom.mil	holynne.steppe.ctr@ustranscom.mil

There has long been a demand in both the warfight and mobility analysis communities to capture the dynamic interaction between the warfight and distribution (mobility and supply chain) processes. As the Distribution Process Owner (DPO), USTRANSCOM completed a project to link the Joint Staff's warfight model, the Joint Integrated Contingency Model (JICM), with USTRANSCOM's mobility model, the Analysis of Mobility Platform (AMP). This modeling linkage allows transportation analysts to capture the mobility impact on the warfight, as well as the warfight impact on distribution. Integration between these two modeling applications provides two-way data exchange, where AMP provides unit closures at PODs for Combat (land and air) and CSS units, ship departures from POEs, and weapon closures. JICM provides AMP with a data feed of theater unit movements and postures, ship damages, and port losses. Coupled together, this modeling effort will allow USTRANSCOM analysts better understand the effects of the warfight on the overall distribution system. This presentation focuses on the modeling effort objectives, the technical challenges that were faced by the modeling development teams, and the phased development approach that was taken.

Aligning DOD Capabilities-Based Assessment Inputs for Testing in a Joint Environment

AbstractID: 269

Dr. David A Dryer, OSD	**Mr. Gerald Gendron, OSD**
Joint Test & Evaluation Methodology (JTEM) JT&E	Joint Test & Evaluation Methodology (JTEM) JT&E
7025 Harbour View Blvd., Suite 105	7025 Harbour View Blvd., Suite 105
Suffolk,VA 22311	Suffolk,VA 22311
757-638-6091	757-638-6048
FAX: 757-638-6170	FAX: 757-638-6170
david.dryer@jte.osd.mil	gerald.gendon@jte.osd.mil

In order to perform integrated test and evaluation (T&E), acquisition program managers (PMs) are directed to test systems that provide capabilities for joint missions in the expected joint operational environment and in realistic operational conditions. A joint operational context for test (JOC-T) structure is being developed by the Joint Test and Evaluation Methodology (JTEM) project to help address this requirement. Aspects of the JOC-T include mission objectives, operational and system descriptions of Blue forces performing joint tasks, threat forces, and environmental conditions. Acquisition programs are currently reliant on a broad range of Department of Defense (DOD) capability-based assessment inputs to provide authoritative source descriptions of JOC-T elements. Unfortunately, this set of DOD capability inputs has inconsistencies and gaps when applied to developing the JOC-T. The opportunity exists for improved JOC-T alignment of key DOD readiness and capability development processes and information systems. For example, the Defense Readiness Reporting System (DRRS) shows potential linkage to the Joint Capabilities Integration and Development System (JCIDS), the Integrated Priority List (IPL), Joint Operations Concepts (JOpsC) family, and Analytical Baselines. The JOC-T needs to reflect warfighter mission desired effect, task, and functionality gaps, as documented in the COCOM IPLs. The integration of DOD systems are increasing to the point where outputs from some systems are, in fact, the inputs to other systems. This presents the analytical community with opportunities to leverage systems (such as DRRS) to inform other processes such as the IPL, JCIDS, JOpsC, and Analytical Baselines for enhanced JOC-T development. An envisioned end-state of an improved DOD capability assessment system of systems harnesses the frequent and tactical-level inputs from DRRS, along with the yearly concerns outlined in the IPLs, in a way that enables the acquisition and testing communities to directly access authoritative JOC-T elements for capability testing. The authors propose to review key information structures and features of various capability-based assessment systems that would further enable JOC-T development processes being transformed by JTEM project.

Joint Force Mix Analysis in OSD (PA&E)

AbstractID: 257

Mr. John R Duke	**Lt. Col. Tim Smetek, USAF**	**Mr. Erik Adams**
Northrop Grumman Corporation	OSD(PA&E)	SAIC, Inc
713 Fontaine St	1401 Wilson Blvd Suite 300	1401 Wilson Blvd Suite 300
Alexandria,VA 22209	Arlington,VA 22209	Arlington,VA 22209
703-963-1240	703-696-9360	703-696-9360
DSN: 426-9360	DSN: 426-9360	DSN: 426-9360
jduke2004@comcast.net	timothy.smetek@osd.mil	Erik.Adams.ctr@osd.mil

Over the course of the Operational Availability (OA) series of studies, the Simulation and Analysis Center (SAC), OSD (PA&E), in collaboration with the Joint Staff, CoComs, and Services, has conducted joint force mix analysis in order to assess how well joint force structure sources the full range of military operations required by the US defense strategy. The purpose of this briefing is to update analysts on the evolving tools, methodology, and analytical purpose of this analysis. Generally, joint force mix analysis simulates the day-to-day demands for forces over

time, compares demands to available supply, calculates “stress-on-the-force” metrics, and identifies needed capacity by unit type. Force structure demands are specified in a schedule of events developed from Analytic Agenda Defense Planning Scenarios. The supply of available forces is based on each service’s programmed force structure. Variables in this type of analysis include: 1) strategic environments and associated event schedules; 2) rotation base requirements; 3) Reserve Component availability; and 4) unit type groupings and substitutions. The Timeline Development Tool (TDT), a quick turn spreadsheet estimator, was used in the most recent OA study to develop and test the scenarios and to assess the “stress-on-the-force.” Subsequently, the new Force Allocation Tool (FAT), an extension to the TDT, was used to assess how much of the defense strategy may be performed by the programmed force in terms of vignettes and their associated types and policy priorities. Each of these tools is at varying levels of development and provides slightly different information based on the evolving analytical purpose. Collectively, these tools and methodology enable joint force mix analysis across varying strategic environments in support of the Defense Strategy.

Export Controls and the Health of the US Space Industry

AbstractID: 42

Mr. Alan D Dunham
National Security Space Office
1670 Air Force Pentagon, MD777
Washingotn,DC 20330-1670
571-432-1426
FAX: 571-432-1223
alan.dunham.ctr@osd.mil

The National Security Space Office and the Bureau of Industry and Security, US Department of Commerce, conducted an extensive (52 page) survey of the US Space Industry in 2007. The goals of the study were to evaluate the industrial, economic, and financial factors affecting the US Space Industrial Base, determine if UA export controls and practices are impacting space prime contractors and sub tier contractors, and develop findings and conclusions for the Space Industrial Base Council. The survey was sent to 274 space industry b=companies and business units and the team received 237 inputs for an 86% response rate. Approximately 70% of the companies were in good health (low risk). Twenty-five percent of the companies were considered at moderate or high risk. R&D expenditures grew an average of 8% a year, primarily in Tiers 2 and 3. The impact of export controls varies by tier with more pronounced cost of compliance impacts on lower tiers. The average processing time for export control Technical Assistance Agreements is over nine months. Several recommendations were made to the Space Industrial Base Council.

Excursions to the MCO-2 Long Range Analytical Baseline

AbstractID: 198

Mr. Preston Dunlap, OSD
OSD/PA&E
1401 Wilson Blvd, Suite 300
Arlington,VA 22209
703-696-9360
preston.dunlap@osd.mil

OSD Program Analysis and Evaluation (OSD/PA&E) Simulation and Analysis Center led the Major Combat Operations 2 (MCO-2) Long Range Study or “Winter Study” to develop the Analytical Baseline with the joint community. Since then, excursions have been conducted to examine a variety of political constraints, capabilities, advanced technologies, and ensuing CONOPS adjustments for both friendly and enemy forces. The study also set out to identify a campaign-level “knee in the curve” that could swing victory. This brief will present a summary of the process, excursions and sensitivity analyses, and insights generated from the study.

Nexus: An Interpretive Social Simulation applied to the Political Economy of Rent Seeking States

AbstractID: 179

Dr. Deborah V Duong
OSD/PA&E Simulation and Analysis Center
1225 South Clark Street
Arlington,VA 22202
703-699-2341
FAX: 703-604-6400
debbie.duong.ctr@osd.mil

Nexus is an intelligent agent-based model of support between groups. It is based on the principles of interpretive social science, as each agent seeks a coherent picture of who it supports and who is responsible for salient events. Each agent has a Constraint Satisfaction Neural network that it uses to take all it knows into account in its decision to support groups. In the past, it has been used in the analysis of several scenarios, and a version which is enhanced to operate within the political economy of rent seeking states is presented.

Strategic Data Farming: Verifying Wargame Adjudicators to support the Model-Game-Model Analysis Technique

AbstractID: 180

Dr. Deborah V Duong

OSD/PA&E Simulation and Analysis Center
1225 South Clark Street
Arlington,VA 22202
703-699-2341
FAX: 703-604-6400
debbie.duong.ctr@osd.mil

In a war game, if all moves are automatically adjudicated, then it is often possible to use game tree technology to in conjunction with heuristics to play these wargames with out humans in the loop, in an agent based simulation, better than a human can play them. Of course, this involves “gaming the game,” however, if exploring the space of strategies that win the game exposes strategies that we don’t want to win, then using a gametree can be an important tool for VV&A, to make sure the way to win the adjudicator corresponds to theories of how one should win. Once the (now stronger) adjudicator is played with Humans in the loop, Humans that have knowledge of the rules can get into the game, and their strategies can help to further develop the evaluation function of the game tree. Using these new heuristics, the model can be run again without Human in the loop, to achieve the statistically significant number of runs needed for analysis. This model-game-model technique uses human in the loop wargames to help build agent based models and agent based models to help wargames. In using the sometimes quite advanced and detailed technology of the commercial wargame, the model-game-model approach allows a player to “get inside” and interact with an agent based model, so as to improve it.

Oz: A War Game Controller that supports analysis

AbstractID: 181

Dr. Deborah V Duong
OSD/PA&E Simulation and Analysis Center
1225 South Clark Street
Arlington,VA 22202
703-699-2341
FAX: 703-604-6400 debbie.duong.ctr@osd.mil

Wargames have a lot to offer for the purpose of analysis, in addition to their value for training and entertainment. However, to use war games as a scientific instrument, they need to be properly prepared for statistical analysis. This talk discusses the continuum from free play wargaming to closed commercial-type wargames, to simulations with human in the loop, to constructive agent based simulations, and how to use wargames from all over the continuum for the purpose of analysis. The Oz wargame controller, which facillitates the statistical analysis of war games and integration of wargames and other methods of analysis, is presented, that can use wargames from both ends of the spectrum for analysis.

Validation, Verification and Accreditation of Agent Based Models

AbstractID: 182

Dr. Deborah V Duong
OSD/PA&E Simulation and Analysis Center
1225 South Clark Street
Arlington,VA 22202
703-699-2341
FAX: 703-604-6400
debbie.duong.ctr@osd.mil

There is a belief in the DoD that agent based simulations are characterized by less rigor than traditional conventional DoD simulations. However, the concept of keeping significant figures in science suggests that we are wasting our time being very exact with one part of our conventional models (the “piston” part) , if the crux of the problem is assumed away: that maneuver, or politics, or anything else that is not convenient to compute, does not matter. Very precise PK data does not make a piston simulate the battle of Thermopile any better. The problem is not in the data, if the relations between the data are unknown. A model with unobtainable data is often a model that had assumed away the problem. However, the advantage of that agent based simulation has over systems dynamics simulation is that it is able to actually walk through a problem without assuming it away, to model cause instead of correlation. Agent based modelers have found that correlational data actually hurts a simulation output, because of double counting. Further, it would not do any good to start an agent based simulation off with precise real world data if it was a state that the simulation could not itself generate or explain and therefore can not predict the next step of. Techniques to get a simulation to generate a particular real world instance are presented.

The concept of the ideal simulation is introduced. The real world is only one instance of possible simulation worlds, and because of the arbitrary nature of many social phenomena, we can not expect an ideal simulation to generate the real world precisely. The characteristics of the ideal simulation include the property of finding the least sum squared error for a certain span of time out of other less correct simulations, and the ability to find patterns predicted by theory. For example, an ideal simulation of the emergence of language may predict patterns according to a theory, but will not predict particular phonemes of a language, because they are arbitrary.

Hephaestus: Application to Strategic Airlift Force Structure Cost Analysis

AbstractID: 301

Maj. Matthew Durkin, USAF
AF/A9RI

1777 N. Kent Street
Rosslyn,VA 22209
703-588-6930
Matthew.Durkin@pentagon.af.mil

Hephaestus is a program analysis tool developed by AF/A9 in partnership with the Air Force Cost Analysis Agency (AFCAA) that captures cost data from many sources and allows analysts to change assumptions on critical factors. This presentation focuses on the structure and use of such a tool to conduct a cost comparison of strategic airlift force mixes with varying purchase profiles, kit prices, and expected operational cost savings due to future modification programs.

Enabling Tactical Analysis Through Distributive Computing Techniques

AbstractID: 87

Mr. John Duselis
University of California-Irvine
256 B Ave Granada
San Clemente,CA 92672
949-218-4291
jduselis@uci.edu

Dr. Isaac Scherson
University of California-Irvine
Dept of Computer Science-U of California-Irvine
Irvine,CA 92697-3425
949-824-7713
isaac@ics.uci.edu

Computationally intense applications supporting operations analyses are becoming prevalent in the war on terror. Affordable multi-core personal computers and heavy reliance on distributed computing techniques (such as Service Oriented Architecture systems) allow greater computing power to promulgate these applications. This may allow lower level, tactical (battalion level and below) users greater ability for conducting their own analyses without relying on higher level or outside agencies. However, problems such as robust or expensive systems, greater systems administration, and old equipment need to be addressed. To empower the tactical user, applications and environments must be developed requiring little administrative overhead, follow a point-and-click mentality, return a result in an actionable amount of time, and run in a baseline software environment.

The Tactical Lightweight Adaptive Distributive Computing Environments (TLADCE) enables a tactical user the ability to distribute a computationally intense application transparently. It is composed of three elements: an application, a Transparent Remote Execution (TREx) tool, and a predictive analysis engine.

Transparent Remote Execution (TREx) is a general-purpose tool that provides a cost effective, lightweight, high-performance distributive framework to execute applications. It requires little administration and no additional software. An application that uses TREx will run in the background - not evident to the user of the local or remote computer. The predictive capability will determine the optimal distributivity of an application on a dataset, and provide options to the user such as how much data is being analyzed, or to what fidelity or resolution the application will provide, and in what amount of time the application will finish executing.

Applications can greatly vary. The current test application is the Tactical Analysis Tool (TAT); which is a simple geographic coordinate converter and clustering tool. This tool allows a commander to quickly identify IED hotspots in his AO using clustering techniques, create profiles of insurgent activity, establish trends, etc. Other applications could include image processing, tracking, or geographic profiling tools. The counterinsurgency is being won at the â€œboots on the groundâ€ level and we must look to provide the capabilities to enhance their mission capabilities.

Intelligence Life Cycle Cost Estimating

AbstractID: 92

Mr. Tim Edem, USAF
Air Force Materiel Command, Intelligence Squadron (AFMC IS/A
2450 D. Street; Bldg 20, Room 200
WPAFB,OH 45433-7629
937-656-7602
DSN: 986-7602
FAX: DSN 986-7609; 937-656-760
Timothy.Edem@wpafb.af.mil

Air Force weapon systems have become increasingly dependent on integrated intelligence information/data. Without it, some systems cannot execute their mission. Intelligence cost estimating has been a long identified need within Air Force acquisition organizations.

Under the direction of HAF/A2, and HQ AFMC A2/5, the Intelligence Costing Working Group (ICWG) was established to develop an Air Force/Defense framework for identifying and estimating the cost of intelligence requirements. The ICWG is chaired by Air Force Materiel Command's Intelligence Squadron, Plans & Resources Flight (AFMC IS/A2X).

The ICWG goals are to 1) Develop an Air Force process and methodology for estimating the cost of intelligence requirements early and in all phases of the acquisition process (Capabilities Development, Concept Refinement, Technology Development, System Development & Demonstration, Production & Deployment, and Operations & Support); and 2) To institutionalize this process and methodology through inclusion in appropriate Air Force/DoD instructions, directives and any policy, procedures, or guidance publications and the Program Objective Memorandum (POM) process.

As future systems become more intelligence dependant, the cost of omitting intelligence integration will increase. The intent of the ICWG is to reduce and/or remove weapon system program delays and additional costs caused by poor planning for intelligence needs by institutionalizing the processes identified through the team's efforts.

The ICWG has developed an Acquisition Intelligence Life Cycle Estimating Structure (AILCES) dictionary, very similar to a Work

Breakdown Structure (WBS) dictionary or a Cost Element Structure (CES) which was used to estimate the cost of the Intelligence requirements for the Next Generation Long Range Strike (NGLRS) Analysis of Alternatives (AoA). This was the first ever Intelligence Cost Estimate for a potential weapon system. Clear understanding of the AILCES elements and automation of a costing tool are the next steps in reaching the goals listed above.

Development of the "Reconstitution To The Sea Base" model

AbstractID: 21

LCDR Motale E Efimba, USN OPNAV, N81 Washington,DC 20318-8000 motale.efimba@navy.mil	**Mr. Robert J Stevenson** Systems Planning and Analysis, Inc. 2001 North Beauregard Street Alexandria,VA 22311 703-399-7255 FAX: 703-399-7365 rstevenson@spa.com	**Mr. Brandon Eaton** Systems Planning and Analysis, Inc. 2001 North Beauregard Street Alexandria,VA 22311 703-399-7233 FAX: 703-399-7365 beaton@spa.com

The components of the Naval Seabasing overarching concept are; Close, Assemble, Employ, Sustain and Reconstitute (CAESR). A great deal of Navy and Marine Corps analyses have focused on, and thus developed tools/models for the "CAE&S" of "CAESR," but there has been little progress with regards to the "R" (Reconstitute or Reconstitution). As part of the OPNAV N81 World Class Modeling (WCM) effort, Systems Planning and Analysis, Inc (SPA) was tasked to develop an analytical capability for Department of the Navy, capable of assessing the reconstitution of an expeditionary force back to a sea base. This presentation will convey to the audience the process used by SPA and N81 during this project. In accordance with the Operational Analysis (OA) method, we will describe our procedures for "formulation of the problem," which included soliciting both Navy and Marine Corps stakeholders' input. Next, we will discuss our "analysis of the problem," to include a detailed development of the reconstitution processes and the spiral development of a stochastic simulation reconstitution model. Additionally, we will demonstrate the tools developed and show how they come together to allow the analyst to tailor the lay-down of equipment, supplies and personnel and model their movement back to the sea base. The brief will conclude by "communicating the results," through the presentation of output examples.

Development of the "Reconstitution To The Sea Base" model

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LCDR Motale E Efimba, USN OPNAV, N81 Washington,DC 20318-8000 motale.efimba@navy.mil	**Mr. Robert J Stevenson** Systems Planning and Analysis, Inc. 2001 North Beauregard Street Alexandria,VA 22311 703-399-7255 FAX: 703-399-7365 rstevenson@spa.com	**Mr. Brandon Eaton** Systems Planning and Analysis, Inc. 2001 North Beauregard Street Alexandria,VA 22311 703-399-7233 FAX: 703-399-7365 beaton@spa.com

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Constructing an Information Operations Analytical Tool

AbstractID: 217

Dr. Brian Efird Sentia Group 1066 31st Street, NW Washington,DC 20007 240-418-6902 FAX: 202-318-0255 bae@sentiagroup.com	**Dr. Philippe Loustaunau** Vista Consulting LLC 3835 North 9th Street, PH1W Arlington,VA 22203 571-236-1427 ploustaunau@yahoo.com	**Mr. Brett Marvin** Sentia Group 1066 31st Street, NW Washington,DC 20007 202-215-2565 blm@sentiagroup.com
Mr. Mike Williams Sentia Group 1066 31st Street, NW Washington,DC 20007 202-506-0954		

mjw@sentiagroup.com

A modeling system that can reliably simulate the flow of information among, and its impact on stakeholders and audience segments in foreign countries would provide IO planners and operators with the capability to systematically plan, execute and assess courses of actions. Such a modeling system would not only provide a forward-looking capability to identify the trends and risks as a consequence of various U.S. government IO options, but also advance the state of research across a variety of academic disciplines.

Three primary research areas must be integrated to create a rigorous IO analytical tool.

Systematic and Scalable Audience Segmentation, and Codified and Semi-Automated Decomposition of Messages: Commercial firms, communication professionals and marketing firms have a long history of success in the areas of audience segmentation and message decomposition. While currently time and labor intensive, their methodologies have been documented and codified with enough precision that it is now possible to develop scalable, semi-automated processes and technologies to characterize the environments IO planners intend to influence and apply a systematic coding schema to decompose messages.

Information Network Modeling System: An integrated modeling system that simulates the flow of information among audience segments and stakeholders (obtained above), reflecting accurate information channels, can be developed using an arc-node topology that encodes capacity and flow. In this model, the information that flows would be the “packets” obtained from the message decomposition above.

Assessment Capability: The impact assessment across the information network would be done at the information-packet level and then integrated, using political bargaining and social dynamic modeling.

The above described system would provide national-level agencies and Combatant Commands with the ability to conduct deliberate and crisis action planning and near real-time assessment. Such an effort represents a substantial advance over the current state of social science modeling by linking a model of the physical information environment to social and political relationships.

War Gaming Analysis for the Counter-Insurgency

AbstractID: 121

LTC Loren Eggen, USA
US Army Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060-5230
703-806-5598
DSN: 312-656-5598
FAX: 703-806-5726
loren.eggen@us.army.mil

LTC Michael Corson, USA
US Army Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060-5230
703-806-5562
michael.i.corson@us.army.mil

LTC Jeffrey Libby, USA
US Army Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060-5230
703-806-5382
jeffrey.libby@us.army.mil

LTC Carlos Lizardi, USA
US Army Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060-5230
703-806-5346
carlos.lizardi@us.army.mil

The US Army Center for Army Analysis (CAA) has been developing a counter-insurgency war game model for the last two years. This presentation will explain the procedures necessary to complete an analysis of current counterinsurgency using the war game model developed at CAA. In particular this presentation will describe the study plan, mission analysis, war game development, and the final analysis report. The focus of the analyses efforts are to determine if the proposed security forces have the capability to overmatch a projected range of internal threats. In this context overmatch connotes the capability to contain and defeat the existing enemy while protecting the population with sufficient residual combat power to fix and defeat additional enemy forces should they choose to conduct operations. Additionally, these efforts provide the analytical underpinnings to support preliminary recommendations on the associated force management and sustainment requirements to generate and sustain the force.

Developing a model that accurately represents effects associated with counter-insurgency operations is challenging. A table-top war game offers the advantages of allowing human interaction and decision making that computer models cannot. There are six steps to making a fact-based war game: Identify the object of the war game and what results you want to measure, make critical assumptions, use historical data to conduct a trend analysis, develop the combat resolution between counters, produce tracks that are a measure of military, information, economical or political effects, and validate and verify the model. Insights into the conduct of operations, the size of forces, and necessary resources can be acquired from the resulting information. This method is consistent with current doctrine, e.g. FM 3-24 Counterinsurgency.

Developing Unclassified Scenarios to Support Test and Experimentation

AbstractID: 362

MAJ Christopher J Emond, USA
U.S. Army TRADOC Analysis Center (TRAC)
255 Sedgwick Avenue
Fort Leavenworth,KS 66027
913-684-9165
DSN: 552-9165
FAX: 913-684-9288
christopher.emond@us.army.mil

MAJ Matt Koehler, USA
U.S. Army TRADOC Analysis Center (TRAC)
255 Sedgwick Avenue
Fort Leavenworth,KS 66027
913-684-3329
DSN: 552-3329
FAX: 913-684-9288
matthew.koehler@us.army.mil

Traditionally, the Army's Training and Doctrine Command (TRADOC) standard scenarios are derived from Defense Planning Scenarios (DPS) and their accompanying Multi-Service Force Deployment (MSFD) documents. These sources describe the specific region, threat, operational situation, objectives, forces and timeframe for an operation. Using DPS/MSFD-based scenarios provides credibility for analysis of future force capabilities and requirements experiments and evaluations. But DPS/MSFD-derived scenarios have limitations. First, their classification usually restricts involvement of allied and foreign participation. Second, they are time-sensitive and require updates approximately every two years which can be costly and time-consuming. The MSFD takes six to eight months to complete following the DPS, and subsequent TRADOC standard scenarios take an equal amount of time after the MSFD, thus limiting the useful lifespan of a TRADOC standard scenario tied to DPS. Lastly, they are explicit in the region and threat. In order to evaluate requirements and capabilities across the full spectrum of military operations and challenges, a number of different TRADOC standard scenarios are required.

TRADOC recognized the need for an unclassified long term scenario that was versatile and overcome some the limitations of the DPS/MSFD scenarios. As the executive agent for developing TRADOC standard scenarios, the TRADOC Analysis Center (TRAC) developed the Multi-Level Scenario (MLS). MLS is based on fictional countries that can be overlaid on any region in the world. The base scenario uses US terrain and an unclassified, doctrinally-based opposing force. The modular construct of MLS allows TRADOC a venue to develop multiple scenarios under the same framework.

TRAC built and TRADOC approved MLS Module 1, a version focused at the Division on 27 June 2007. TRAC is developing MLS Module 2, a follow-on version focused on the Corps level. It is being developed to support studies, analysis, experimentation and testing of the Future Combat System, to be conducted in the Southwest U.S. This paper and associated briefing will discuss past and expected uses of the MLS family, as well as the planning and considerations used to develop them.

Genetic Algorithm Cross-Leveling Equipment Heuristic

AbstractID: 451

Mr. Jake Enholm
Concurrent Technology Corporation
1604 S Villas Ln
Chandler,AZ 85248
480-292-4158
enholmj@ctc.com

This abstract describes the effort involved in solving a problem where the Marine Corps needed to cross level equipment. Cross-leveling is an old military term where some units' supplies are drawn to reinforce other units. The desired end state is a uniform supply level across the unit pool, so that no unit carries a higher reinforcement burden than the others. This process can be described as an optimization problem, where you are minimizing the distance from the average supply level of the supplying units. A Genetic Algorithm (GA) was written as a heuristic to solve this problem. GAs are stochastic search techniques that mimic evolutionary processes via random selection, fitness of solutions, and random mutation to "evolve" a population of possible solutions into a global solution. Convergence efficiency was increased when "unfit" or unfeasible solutions were allowed to remain in the population during execution. The GA was validated with solutions drawn from a standard reduced gradient solver.

Global Access and Infrastructure Assessment

AbstractID: 292

Maj. Chad Erspamer, USAF
USTRANSCOM JDPAC
709 Ward Drive
Scott AFB,IL 62225
618-220-5169
DSN: 770-5169
Chad.Erspamer@ustranscom.mil

The U.S. requires global mobility to decisively achieve national security and strategic objectives. The en route system should allow the U.S. to project national resources globally. However, the existing system is air-centric and based on pre-Global War on Terror (GWOT) legacies. While the resulting East-West strategic mobility super-highway provides excellent coverage in the Northern Hemisphere, it provides limited access to the Southern Hemisphere. The current strategic environment—marked by GWOT, emerging areas of interest, and fewer forward deployed forces—requires re-examination of the en route system. The USTRANSCOM commander initiated the Global Access Infrastructure Assessment (GAIA) to identify physical and geopolitical challenges and recommend solutions to expand global access. This presentation will address the GAIA objectives, approach, products, and work accomplished to date.

Army Operational Employment Database

AbstractID: 151

Ms. Trudy A Ferguson, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5537
DSN: 656-5537
FAX: 703-806-5750
trudy.ferguson@us.army.mil

The Army Operational Employment Database (AOED) is a relational database of historical data on U.S. Army deployments to Lesser Contingency and Major Combat Operations from September 11, 2001 to the present time. The primary objective of the database is to provide a current and comprehensive record of the worldwide cumulative demands on Active Army, Army Reserve, and National Guard forces which can be used to support a wide array of analytical requirements. The presentation provides an overview of AOED capabilities and shows specific examples of how the database has been used to respond to taskings to identify trends in the deployment of both Army forces and units.

Historical Analysis of Lesser Contingency Operations

AbstractID: 152

Ms. Trudy A Ferguson, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5537
DSN: 656-5537
FAX: 703-806-5750
trudy.ferguson@us.army.mil

The Center for Army Analysis (CAA) conducted a historical analysis of Lesser Contingency (LC) operations under the sponsorship of the War Plans Division, Office of the Deputy Chief of Staff – G3. The analysis uses a database of joint operations occurring from January, 1990 through March, 2007 (with a focus on operations occurring since September, 2001). The methodology uses a discrete event simulation based on queuing theory to predict the number, frequency, and duration of future LC operations. An analysis of the data provides insights on how irregular warfare has changed trends in overall operations. To estimate personnel and units needed to support the set of predicted operations by mission type, the analysis uses an EXCEL spreadsheet model, which matches predicted operations to representative Army force lists. Analysis results incorporate both the uncertainty associated with the duration and frequency of operations and the uncertainty associated with the utilization of soldiers and units to provide a basis for evaluating the risk associated with key resource decisions.

System of Systems Measurement in Evaluation of Joint Mission Effectiveness

AbstractID: 174

Mr. Mark J Fiebrandt
Joint Test & Evaluation Methodology
7025 Harbour View Blvd; Suite 105
Suffolk,VA 23435
757-638-6055
mark.fiebrandt@jte.osd.mil

Mr. John Wilson
Joint Test & Evaluation Methodology
7025 Harbour View Blvd; Suite 105
Suffolk,VA 23435
757-638-6056
john.wilson@jte.osd.mil

The Department of Defense (DOD) is transforming its way of acquiring new systems and capabilities. Joint capabilities are becoming increasingly more complex as integrated System of Systems (SoS) must exhibit key characteristics, such as interoperability and adaptability, on a joint battlefield. Traditional Operational Test and Evaluation (OT&E) focuses on evaluating effectiveness, suitability, and survivability of individual systems through a measurement framework of critical technical parameters (CTP), critical operational issues (COI), and key performance parameters (KPP). The United States DOD Joint Test and Evaluation Methodology (JTEM) project was established to develop enhanced methods and processes to test and evaluate the effectiveness of SoS in achieving joint missions. One of the foundations for JTEM project deliverables is a Capability Test Methodology (CTM) for conducting tests in a joint mission environment. The CTM includes an enhanced analytical framework which must continue to support system T&E, but additionally incorporate critical joint issues (CJI), mission desired effects, and joint tasks into the evaluation ontology. The objective of this presentation is to examine the measurement framework of the T&E community and to propose methods and processes in the analysis thread of the CTM that will incorporate evaluation of SoS performance and contribution to joint mission effectiveness (JMe). The presentation will examine test design, measurement epistemology, and operations research techniques to suggest an analytical methodology that will aid analysts and decision makers in planning and conducting tests of SoS in a joint mission environment (JME) and that will evaluate SoS contributions to joint mission effectiveness.

System of System Effectiveness Analysis and Visualization

AbstractID: 183

Mr. David Flanigan

The Johns Hopkins University Applied Physics Laboratory
11100 Johns Hopkins Road
Laurel,MD 20723
240-228-8129
david.flanigan@jhuapl.edu

When faced with providing surveillance and fire control resources to defend a High Value Unit (HVU), planners may have multiple sensor and weapon platforms at their disposal to execute this mission. These platforms are often dissimilar in form and capability (e.g. surface ship, aircraft, UAV, etc.) that must be correctly understood and managed by planners to provide both effective defensive and offensive functions. When considering the deployment of these diverse assets, a first-order analysis and visualization of expected effectiveness is generated to consider the combinations of multiple variables of these platforms. Some of these variables may include surveillance / shooter stationing, sensor effective ranges, and weapon capabilities. The analysis is intended to provide insight into the various System of Systems (SoS) configurations and interdependencies that can best influence the outcome of the mission. The effectiveness visualization is used to show a geometric relationship of protection effectiveness as a function of the ranges between threat, HVU, strike, and surveillance assets. Varying the capabilities of friendly and enemy platforms will also influence this effectiveness calculation and visualization.

This paper will identify a process used to consider the multi-variable decisions for an effective SoS employment. To demonstrate the flexibility of the process, several illustrative scenarios are used to display dissimilar platform employment concepts to perform various missions.

C-130 Center Wing Box (CWB) as a Business Case Study

AbstractID: 328

Lt. Col. Mark Foringer, USAF
AF/A9RI
1777 N Kent St.
Arlington,VA 22209
703-588-6936
Mark.Foringer@pentagon.af.mil

C-130 aircraft are the workhorse of the Air Force and the C-130 fleet is currently undergoing a center wing box replacement in order to remain airworthy. New aircraft designs like the A380 use a fiber metal hybrid material to increase life and reduce maintenance costs. AF/A9 analyzed the preliminary business case for a new center wing box on the C-130 H2/3 and C-130J to determine if the AF could reap the benefits of this hybrid materiall. In addition to aggregating multiple data sources to show the current level of planned spending and net present value of the proposed hybrid program, A9 analysts used Crystal Ball v5.2 to perform risk and sensitivity analysis by allowing the development, procurement, and maintenance costs to vary.

Comprehensive Analytic Framework for AF Fighter Force Recapitalization

AbstractID: 337

Lt. Col. Mark Foringer, USAF
AF/A9RI
1777 N Kent St.
Arlington ,VA 22209
703-588-6936
Mark.Foringer@pentagon.af.mil

Mr. Jim Holt, USAF
AF/A9FC
1777 N Kent St.
Arlington ,VA 22209
703-588-8885
James.Holt.ctr@pentagon.af.mil

Mr. Michael Larkin, USAF
AF/A9RI
1777 N Kent St
Arlington,VA 22209
703-588-6901
Michael.Larkin@pentagon.af.mil

Mr. William Troy, USAF
AF/A9FC
1777 N Kent St
Arlington,VA 22209
703-588-8170
William.Troy@pentagon.af.mil

Efficient air fleet management requires a comprehensive approach which considers how to best revitalize, modernize, operate, and maintain aircraft. However, Department of Defense investment strategies are impacted by numerous external forces that work against systematic recapitalization planning. To account for these forces, a solid, research-based methodology is essential to ensure critical capabilities are available to meet national security requirements. Our comprehensive fleet management approach accounts for operational requirements, industrial capacity, and health of the current inventory. We apply this to the Air Force's fighter inventory as a case study by first investigating the force-structure required to meet current needs and future scenarios. We then determine the cost-constrained limitations on procurement of replacement aircraft. Finally, we look at legacy forces' service life considerations and examine growing gaps in capability over time. In this manner, we show how a comprehensive framework for analysis can be used to inform AF fighter force structure decisions.

Band 2E/4L Transmitter Reliability Analysis

AbstractID: 79

Dr. Peter J Francis
CNA
4825 Mark Center Drive

Alexandria,VA 22311-1850
703-824-2094
francisp@cna.org

The objective of this paper is to apply survival models to data from the ALQ-99 Tactical Jamming System (TJS) currently used by EA-6B Prowler aircraft. We use data from Band 2E and 4L transmitters. The key takeaway from the statistical analysis of this data is that correctly estimating characteristic parameters, such as Mean Time Before Failure (MTBF), can depend on assumptions concerning the underlying probability distribution of the breakdown process. This is illustrated by calculating estimates of MTBF for the ALQ-99 data under several alternative modeling assumptions. It is evident that the results are substantially different depending on which of several distributions one assumes in the calculations. It is also worth noting that, for some distributions, the means and medians are in general different and the differences can be substantial. Depending on the reason for interest in these statistics, the difference between mean and median can be important.

We then apply graphical goodness-of-fit checks separately to each of the transmitter datasets for the purpose of discriminating between modeling specifications. Finally, we estimate models involving explanatory variables (drivers, i.e.).

Above all, this paper is meant to be an argument for the collection of timely, accurate, and reliable data. Decisions on which explanatory variables need to be collected must be informed by an engineering-level understanding of the equipment as well as operator and maintainer experience.

CH-53K Systems Design and Development MS&A Support

AbstractID: 313

Mr. Kenneth H Frieder
Mantech Systems Engineering Corporation
46610 Expedition Drive
Lexington Park,MD 20653
301-866-4241
FAX: 301-862-7334
ken.frieder@mantech.com

Mr. John Hargraves
Mantech Systems Engineering Corporation
46610 Expedition Drive
Lexington Park,MD 20653
301-862-7402
FAX: 301-862-7334
john.hargraves@mantech.com

Mr. Michael Beanland
RTR-Tech Inc.
46610 Expedition Drive
Lexington Park,MD 20653
301-862-7387
FAX: 301-862-7334
michael.beanland@rtr-tech.com

Mrs. Valencia Floyd, USN
NAVAIRSYSCOM 4.10
Great Notch Road
Lexington Park,MD 20653
301-342-8316
valencia.floyd@navy.mil

The AIR 4.10 Readiness Analysis Team uses the Aviation Maintenance Model (AMM) to provide multi-phase Modeling, Simulation and Analysis (MS&A) support for the CH-53K Systems Design and Development (SDD) Program. Initial efforts involved assessment of the impact on Mission Capability (MC %), Sortie Success Rate (SSR) and Sortie Generation Rate (SGR), a non-standard Key Performance Parameter(KPP), of changes to aircraft inherent Mission Reliability, required OPTEMPO, and the specified Logistics Footprint. A Phase II effort refined the initial Analytic Baseline and established three additional Analytic Baselines to support evaluation of scenario excursions. Phase III focused upon implementing updated Reliability and Maintainability (R&M) projections, modifying the logic and detailed assumptions underlying the AMM representation of the CH-53K ORD scenario, and performance of additional excursion analysis of the impact of several aircraft design, operational demand and support resource parameters on SGR/SSR. Phase IV efforts have continued MS&A support including review and initial application of updated aircraft R&M projections and initiation of an Accreditation Package to support formal PMA accreditation of AMM as an SGR analysis model.

Current CH-53K R&M projections are based on engineering analysis based predictions. These characteristics have been implemented within AMM at the systems, subsystems and WRA aircraft indenture levels in order to facilitate support of increasingly detailed analysis of projected aircraft operational performance and design risk assessment. These parameters will continue to be updated as the CH-53K design evolves. The maturation of the Design Baseline will require periodic adjustment to the Analytic Baseline in order for MS&A to continue to provide a basis for analytically defendable and credible decisions. Excursion analyses from the most current Baselines will therefore continue to be needed throughout the CH-53K program life cycle in support of systems engineering activities, design, developmental and operational testing.

This presentation will provide highlights of the analytical process and model development/update approach that enable our MS&A Team to continue to provide timely, insightful data in support of an evolving aircraft system's SDD information requirements that cannot be fully supported by traditional engineering analysis and operational test and evaluation programs.

Monte Carlo Estimation of Air Ambulance Requirements

AbstractID: 234

LTC Lawrence Fulton, USA
Center for AMEDD Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234
210-658-9936
larry_fulton@att.net

Mr. Jack Zeto, USA
Center for Army Analysis
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234
210-658-9936
jack.zeto@us.army.mil

Mr. Pat McMurry
Center for AMEDD Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234
210-221-9404
patrick.mcmurry@us.army.mil

In this study, we establish a recommended medical workload-planning factor for Army air ambulance requirements based on Total Army Analysis (TAA) admission streams and in support of an ongoing Force Design Update (FDU). We apply Monte Carlo techniques to convert admissions to air ambulance requirements using empirical distributions from recent combat operations. The results of this study indicate that a planning factor between .3 and .5 aircraft per admission may be appropriate for planning medical evacuation support.

Modeling and Trading Systems between Joint Capability Areas

AbstractID: 302

Dr. Mark Gallagher, USAF
AF/A9R
1777 N. Kent Street
Rosslyn,VA 22209
703-588-6949
Mark.Gallagher@pentagon.af.mil

OSD and the Joint Staff have defined nine Joint Capability Areas (JCAs). Some have proposed these JCAs could be used for Capability Portfolio Management. This implies that systems would map to a primary JCA. We propose that balancing the DoD forces requires evaluations that consider platform/system contributions across JCAs and across scenarios. We formulate a linear program that selects a robust force that performs well in all scenarios. Higher fidelity models should be used to determine the linear program parameters and verify the reasonableness of solutions.

Fundamentals of Military Wargaming: An Operations Research Perspective

AbstractID: 489

Mr. Michael W Garrambone
General Dynamics
5200 Springfield Pike, Suite 200
Dayton,OH 45431
937-476-2516
FAX: 937-476-2900
mike.garrambone@gd-ais.com

We know that Military Wargaming is one of the tools of the Operations Research Analyst, but we also know it is not the shiniest one. It does not get the depth of training the others tools get, and gets less “stick time” than the other tools often because the results from using this tool are not strongly analytical or have robust statistical significance. None-the-less, wargaming is very useful because it provides insights into operations and processes that cannot be touched by other OR techniques. Through wargaming we find blind spots, strategies, and many outstanding questions that require solid analytical work. Thus wargaming is included in MORS working groups and is widely employed throughout the Government. Wargaming has recently been highlighted in two MORS’s heavily attended workshops. The tutorial being presented is designed for the novice who is interested in wargaming. It provides fundamental understandings about Military Wargaming from the Operations Research Analyst perspective. This perspective is different for OR types in that the traditional shedding of light that analysts seek has had more to do with the outcome of simulations whereas the conflict gaming impact concentrates on what the player learns from the game and what they do with the knowledge gained. To get the “flavor” right for analysts this tutorial has four parts. The first part concentrates on fundamental OR simulation knowledge that supports wargaming and talks to items as game elements, structure, rules, data, and procedures. It concentrates on the parts of the game that analysts need to understand to assist in game design. Part two concentrates game characteristics and speaks to the phases, design considerations, play sequences, and strengths and limitations. This highlights aspects of wargaming that you must understand including conceptual dangers and common misuses for analysts. The third presentation describes the wargame environment and roles and responsibilities for sponsors, controllers, players, and analysts. Lastly the attendee gets into actual game play which has to be limited because it can be “too” interesting. If you are new to wargaming or are looking to patch holes in your background or experience, you will definitely enjoy this tutorial

Thomas A. Edison: Naval Analyst

AbstractID: 490

Mr. Michael W Garrambone
General Dynamics
5200 Springfield Pike, Suite 200
Dayton,OH 45431
937-476-2516
FAX: 937-476-2900
mike.garrambone@gd-ais.com

By popular request, we bring back this year the tutorial on the most famous inventor of our times, Thomas Alva Edison. Edison was self-educated, a firm believer in the scientific method, and had an incredible investigative mind. He was a man of great rigor and displayed an exceptionally successful work ethic. But little is known about his untiring devotion to duty as a World War I Military Operations Research Analyst and his successful leadership of the Naval Consultant Board of the United States. Before World War I, he was renowned as a highly successful inventor and industrialist who expressed concerns for the national military preparedness, the use of “machines” in warfare, and the economic use of limited resources for the defense of this country. Requested by the Secretary Daniels to head this military advisory board, he left his laboratories, rolled up his sleeves, and became a military analyst performing studies along with specialty teams drawn from his board of 24 of the most prominent scientists, engineers, and industrialists in the US. Edison was chosen for his popularity, inventiveness, and spirit,

but analytical work is where he draws our attention. He was by any standards a “strange cat.’ He had scientific methodology on his side, a desire for understanding tactical and operational warfare, and was “mind free” in offending any authority. Come to hear about Edison’s naval studies, how he diligently conducted his work, and what he had to say about what he found. You will discover how he put his day-job aside and joined the navy (unpaid of course) working issues and creating inventions throughout the war. We will discuss how he went to sea to gain had first hand operational knowledge of environmental and technical data. We will talk about the methods he used to perform analyses which became the forerunner techniques of WWII analysts. No warrior analyst today should pass up this presentation. If you are interested in OR history, love discovery and political controversy, and enjoy light-hearted and important discussions on wartime analysis (lesson recorded-but not learned-yet relearned) then you will want to attend this tutorial.

Pantelleria: The Modeling of Operation Corkscrew in World War II

AbstractID: 491

Mr. Michael W Garrambone	**Mr. Jeffrey A Dubois**
General Dynamics	General Dynamics
5200 Springfield Pike, Suite 200	5200 Springfield Pike, Suite 200
Dayton,OH 45431	Dayton,OH 45431
937-476-2516	937-255-0960
FAX: 937-476-2900	FAX: 937-476-2900
mike.garrambone@gd-ais.com	Jeffrey.dubois@wpafb.af.mil

This presentation describes the analytical planning and combat results of one of the most famous operations research analysts of World War II, Dr. Solly Zuckerman. Professor Zuckerman was the zoologist who became one of Winston Churchill’s scientific chiefs going from the study of apes to supporting the planning of warlords. Dr. Zuckerman was assigned by the Marshal of the Royal Air Force as the operations analyst to support General Carl A. (Tooey) Spaatz in the Mediterranean Theater of Operations. General Spaatz was preparing for the invasion of Europe, but attacking Sicily first meant negotiating the “Italian Gibraltar,” Pantelleria, a small fortress island between Africa and Sicily. Pantelleria was well defended with garrisoned units of Italian and German forces. The island was a regional airbase for attack aircraft and served as a submarine base to control the air and water routes between North Africa and Europe. Dr. Zuckerman’s task was to eliminate the Pantelleria’s air and ground defenses preparing it for naval invasion. The operational planning performed and results of this most successful air operation are the subject of this discussion. We describe “Solly’s” use of operations research, his control and analysis of combat data, and the results of his planned sorties. We describe the modeling of “Operation Corkscrew” using the SEAS (System Effectiveness Analysis Simulation) computer model based on the historical reports and archived aerial photos. If you don’t know about “Lord Solly” or about this unique air employment to defeat this adversary then you will doubly enjoy this analytical piece of history.

AFRL Historical Bomber Self Defense Study

AbstractID: 494

Mr. Michael W Garrambone	**Mr. Timothy W Ewart,**	**Mr. Chris R Linhardt,**
General Dynamics	AFRL/RBCD, Air Vehicle Control Directorate	General Dynamics
5200 Springfield Pike, Suite 200	2140 Eighth Street, Bldg 146	5200 Springfield Pike, Suite 200
Dayton,OH 45424	Wright Patterson AFB,OH 45433	Dayton,OH 45431-1255
937-476-2516	937-904-6539	937-255-8629
FAX: 937-476-2900	FAX: 937-255-9746	FAX: 937-476-2900
mike.garrambone@gd-ais.com	Timothy.Ewart@wpafb.af.mil	chris.linhardt@wpafb.af.mil

This presentation describes the findings of the literature search which supports the thinking for the Integrated Air Vehicle Self Defense (IAVSD) Bomber Study. This was an Air Force Research Laboratory historical research effort designed to understand the precedent for self defense on all heretofore US bombers. The study was structured to create a perspective of bomber self defense from the earliest air machines to the current versions of the strategic and low-level penetrators we fly today. This effort begins with a look at the World War I aircraft and examines the various defensive designs, tactics, techniques and procedures employed to successfully perform effective missions while keeping high probabilities of survival. The study began with the fundamental concepts of combat aircraft survivability analysis and design, and went from ship to ship of each era from 1903 to the latest Northrop B-2 Spirit, first delivered in December 1993. The intent of the review was to gather information on self defense considering system designs based on operational desires and system threat assessment capabilities. The presentation is unclassified and describes susceptibility, vulnerability, and the use of aircraft countermeasures. The information obtained will be used to look at self defense for the Next Generation Bomber.

Benefits and Uses of a CBRN M&S Capability Integrated into the MATREX

AbstractID: 149

Mr. Chris Gaughan	**Mr. Tom Hurt**	**Mr. Joey Fann**
US Army RDECOM Edgewood Chemical Biological Center	US Army RDECOM	ITT AES
5183 BLACKHAWK RD, AMSRD-ECB-RT-IM E5951	SOSI	6767 Old Madison Pike, Suite 160
APG-EA,MD 21010-5424	Ft. Belvior,VA 22060	Huntsville,AL 35806-2178
410-436-5560	703-806-0995	256-964-1413
FAX: 410-436-2165	tom.hurt@us.army.mil	joey.fann@itt.com
chris.gaughan@us.army.mil		

Ms. Lana McGlynn

N/A
1805 Crystal Drive Suite 406
Arlington,VA 22202
703-980-8546
lana.mcglynn@gmail.com

The CB Simulation Suite is a distributed simulation tool (Distributed Interactive Simulation (DIS), High Level Architecture (HLA) and Test and Training Enabling Architecture (TENA) compliant) created by the Edgewood Chemical Biological Center (ECBC) in coordination with ITT Corporation that includes a weapons of mass destruction (WMD) environment server (the Nuclear Chemical Biological Radiological (NCBR) Environment Server); simulations of the detector, sensor, and tactical messaging systems that the Services have developed to detect and operate in these environments (CB Dial-a-SensorTM, DAS); and a component capable of tracking the contamination status and exposure levels of entities involved in a distributed simulation exercise (CB Exposure Toxicity Server, ETS).

The Modeling Architecture for Technology, Research, and EXperimentation (MATREX) Program is a key distributed modeling and simulation environment in the US
Army. MATREX provides a unifying Modeling and Simulation (M&S) architecture, supporting tools, and infrastructure to ease the integration and use of multi-resolution multi-fidelity live, virtual, and constructive (LVC) applications.

Currently, the CB Sim Suite is being integrated into the MATREX environment, which will bring high fidelity CBRN capability to the federation. We will present these tools, the benefits of this combined capability and the types of Systems of Systems analyses that it can support. Specifically, we will highlight the types of studies that the CB Sim Suite and MATREX can be conducted that were previously not possible and additional uses of this combined capability.

The Influence of Sharia Law on Intelligence & Law Enforcement

AbstractID: 6

Mr. William Gawthrop
U.S. Army Retired
12402 Stonehaven Lane
Bowie,MD 20715
301-805-2556
gawthrop@aol.com

Islamic Law imposes obligations upon its adherents mandating behaviors and practices adversely affecting sound law enforcement and intelligence doctrine and practices. This presentation identifies specific areas for concern that, if ignored, undermine case development and facilitate the incubation of the insider threat.

Power and International Conflict

AbstractID: 9

Dr. Daniel S Geller
Wayne State University
2043 Faculty/Administration Building
Detroit,MI 48202
313-577-6328
FAX: 313-993-3435
dgeller@wayne.edu

In an international system characterized by anarchy, military force is frequently brought to bear as the ultimate arbiter in deciding conflicts of interest. Even when not directly employed in war, force is often threatened for coercive effect. As a result, explanations of patterns of war and peace usually grant a primary position to the power of states and to their relational balances. This paper will discuss a body of quantitative empirical evidence regarding material capabilities and war at three analytic levels: the state, dyad, and international system. As this analysis will demonstrate, systematically derived quantitative evidence has led to the identification of power-related patterns of war at all three levels of analysis, and theoretical mechanisms have been developed to explain these empirical regularities. In short, the scientific study of the relationship between material capabilities and international conflict has produced an impressive domain of cumulative knowledge in world politics.

Overarching Unmanned Aircraft Systems Study

AbstractID: 65

Mr. David Gibbons, USMC
MCCDC OAD MAA
3300 Russell Rd
Quantico,VA 22134-5130
703-432-8365
DSN: 378-8365
david.gibbons@usmc.mil

Unmanned Aerial Vehicles (UAV) are becoming an important part of the current and future fighting force, but many questions remain about the

characteristics of the future UAVs.

- What should their combat radius be?
- How fast should they go?
- What should their flight endurance be?
- How many of what kind are needed?

These are some of the questions examined in the Overarching Unmanned Aircraft Systems Study conducted by MAA Branch, OAD, MCCDC. The study evaluated the USMC Tier II and Tier III systems as a family of systems approach to evaluate the potential capabilities provided. The U.S. Army TRADOC Analysis Center's Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) model was used to generate service provided in an Irregular Warfare (IW) and a Marine Expeditionary Brigade (MEB) Seabasing scenarios. Each of these scenarios were run multiple times in order to evaluate the impact of changing the UAV characteristics. The MEB scenario was also modeled in the Vector in Commander (VIC) combat simulation to provide insight on what the UAV characteristics could mean in terms of combat outcome. This analysis led to changes in the USMC Tier II Unmanned Aerial System (UAS) CDD for the system structure and provided an analytical basis for USMC UAS required capabilities.

Using Simulation and Combat Modeling to Evaluate Characteristics of Unmanned Aerial Systems

AbstractID: 66

Mr. David Gibbons, USMC
MCCDC OAD MAA
3300 Russell Rd
Quantico,VA 22134-5130
703-432-8365
DSN: 378-8365
david.gibbons@usmc.mil

The Overarching Unmanned Aircraft Systems Study conducted by MAA Branch, OAD, MCCDC used the U.S. Army TRADOC Analysis Center's Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) model and Vector in Commander (VIC) combat simulation to provide insights to the potential capabilities provided by USMC Unmanned Aerial System (UAS) family of systems. This brief focuses on how these tools were used along with some key insights gained thru their use.

Using Monte Carlo Simulations to Evaluate Unmanned Aircraft Systems Reliability Requirements

AbstractID: 101

Mr. David Gibbons, USMC
MCCDC OAD MAA
3300 Russell Rd
Quantico,VA 22134
703-432-8365
DSN: 378-8365
david.gibbons@usmc.mil

Defining and measuring reliability of Unmanned Aircraft Systems (UAS) possess challenges for both analysts and combat developers alike. These systems are composed of 4 major components (air vehicle, payloads, ground control station and launch equipment) that must be operational for the system to be mission capable. This analysis examined the readiness of the USMC small tactical (Tier II) UAS using a Monte Carlo simulation. Using Excel and Insight, the MAA Branch, OAD, MCCDC evaluated the impact of proposed Tier II availability definitions on Tier II UASs hours of service. The analysis led to an improved reliability requirement statement and changes in the UAS composition that were incorporated into the USMC Tier II Combat Development Document.

THE TOTAL ARMY COMPETITIVE CATEGORY OPTIMIZATION MODEL: ANALYSIS OF U.S. ARMY OFFICER ACCESSIONS AND PROMOTIONS

AbstractID: 211

MAJ Hise Gibson, USA
Department of Mathematical Sciences-USMA
600 Swift Rd
West Point,NY 10996
845-938-4018
hise.gibson@us.army.mil

The United States (U.S.) Army's mission is to protect our nation and fight its wars; a mission that requires a substantial resource commitment. The Army today consist of over 505,000 soldiers (more than any other U.S. military service), with over 81,000 of those soldiers comprising the Officer Corps. This thesis develops a linear program to help manage the Army Competitive Category (ACC), a subset of the officer corps

consisting of over 51,000 soldiers. The Total Army Competitive Category Optimization Model (TACCOM) prescribes annual accessions and above zone (AZ), primary zone (PZ), and below zone (BZ) promotion rates for all grades from Lieutenant (LT) to Colonel (COL) over a forty-year horizon. We demonstrate TACCOM using data from fiscal year (FY) 2006 and requirement information for all officers in the ACC and Aviation (AV) branch. We find a deficit at the grade of Major (MAJ) will continue to exist through FY 2021 if current policy is not changed. Our analysis on just the AV branch shows their mid-grade officer shortage can be remedied by either increasing training capacity by two-thirds, or reducing the attrition of Captains who have five years time in grade. Our analysis also shows the current ACC accessions plan and promotion policies remedy the shortages at the grade of MAJ for the next seven consecutive years; but, there are future shortages ahead. Using TACCOM, we find one way to mitigate the magnitude of the future shortfalls is to adjust the current promotion policy to promote officers earlier to MAJ. By accelerating the promotion to MAJ in the ACC the Army is only facing a shortage of MAJs for four consecutive years, from FY 2013 through FY 2017, versus the seven year shortage without a policy change.

Analysis of the Operational Effect of the Joint Chemical Agent Detector Using the Infantry Warrior Simulation (IWARS)

AbstractID: 148

Mr. David B Gillis, USA U.S. Army Materiel Systems Analysis Activity 392 Hopkins Rd APG,MD 21005 410-278-3629 DSN: 298-3629 FAX: 410-278-6865 david.gillis@us.army.mil	**Mr. Kevin M Guite, USA** U.S. Army Materiel Systems Analysis Activity 392 Hopkins Rd APG,MD 21005 410-278-2143 DSN: 298-2143 kevin.guite@us.army.mil	**Mr. Carl M Eissner, USA** U.S. Army Materiel Systems Analysis Activity 392 Hopkins Rd APG,MD 21005 410-278-6382 DSN: 298-6382 carl.eissner@us.army.mil
Dr. George E Steiger, USA U.S. Army Materiel Systems Analysis Activity 392 Hopkins Rd APG,MD 21005 410-278-6442 DSN: 298-6442 george.steiger@us.army.mil	**Mr. Charles E Holman, USA** U.S. Army Evaluation Center 4501 Ford Avenue Alexandria,VA 22302 703-767-3376 charlie.e.holman@atec.army.mil	**Ms. Lynn A Coles, USA** U.S. Army Evaluation Center 4501 Ford Avenue Alexandria,VA 22302 707-767-3376 lynn.coles@us.army.mil

The test and evaluation (T&E) of chemical and biological defense (CBD) systems presents unique and significant challenges due to the constraints and restrictions on the use of actual agents, especially in the presence of Soldiers. Often, evaluations must employ broadly defined correlations based upon limited component testing with agents and operational testing using simulants. The results can be difficult to translate into operationally relevant terms.

The US Army Materiel Systems Analysis Activity (AMSAA) recently conducted an analysis to determine the operational impact of using the Joint Chemical Agent Detector (JCAD) to a small dismounted unit in a chemical battlefield environment.

The JCAD Increment 1 (Incr. 1) is an acquisition category III program with Director Operational Test and Evaluation oversight being developed by the Joint Program Manager – Contamination Avoidance. The Infantry WARrior Simulation (IWARS) was modified to incorporate CB effects and then used to simulate Soldier behaviors in a simulated chemical environment. The transport and dispersion model Hazard Prediction and Assessment Capability (HPAC) was used to provide cloud concentrations and expansion for the chemical warfare agent.

IWARS is an analysis driven, entity-based, multi-sided combat model focused on individual and small-unit dismounted combatants and their equipment. AMSAA and the U.S. Army Soldier Systems Center in Natick, Massachusetts (NATICK) are jointly developing IWARS as an analysis tool to aid in the system performance analysis of weapons and equipment as employed by the infantry Soldier within his unit. IWARS is used to highlight the contribution these systems make (both individually and in various combinations) to a Soldier and their unit's overall effectiveness while performing dismounted tasks and missions.

The scenario, assumptions, modeling work, and accreditation process will be discussed as well as the results of the analysis.

A War Reserve Resource Prioritization Methology

AbstractID: 177

Dr. Kenneth Girardini RAND Corporation 1776 Main Street Santa Monica,CA 90407 310-393-0411 x7851 girardin@rand.org	**Dr. Carol Fan** RAND Corporation 1776 Main Street Santa Monica,CA 90407 310-393-0411 x6271 fan@rand.org

Army units must be ready to deploy anywhere in the event of a contingency. The locations of these contingencies are often unpredictable, making it difficult to plan logistical support. Army Pre-positioned stock (APS) is designed to relieve the initial strain on the supply chain by reducing airlift requirements and meeting contingency demands until a supply chain can be established and the production base can surge. War reserve secondary items (WRSI) are the sustainment stock portion of APS. Such stock may be positioned in the United States, near the anticipated conflict, or on ships that will travel to the region. Typically, war reserve is under-resourced, yet no methodology currently exists by which war reserve allocation can be prioritized or, once priority is determined, what portion will be forward positioned. In this talk, we present a methodology to prioritize resource allocation and positioning of WRSI.

Developing Scenarios and Wargames for Irregular Warfare

AbstractID: 371

MAJ Thomas Glover, USA	**Mr. Klaus Sanford, USA**
TRADOC Analysis Center (TRAC)	TRADOC Analysis Center (TRAC)
255 Sedgwick Ave	255 Sedgwick Ave
Fort Leavenworth,KS 66027	Fort Leavenworth,KS 66027
913-684-9162	913-684-9285
tom.glover@us.army.mil	klaus.sanford@us.army.mil

As current operations clearly demonstrate, the U.S. Military must plan, prepare, and equip for protracted campaigns against irregular threats. Operations largely grouped under the over-arching moniker of Irregular Warfare (IW) are not new, but their prevalence and relevance have increased with the world-wide technological, geo-political, and socio-economic developments of the last two decades. As a result, the need for scenarios and wargames set within the context of IW operations has become paramount to enable the Joint Services, along with the other agencies and branches of the U.S. Government, to test and develop concepts and force designs that address the requirements and tasks associated with irregular challenges. Additionally, the requirements and tasks inherent to these operations provide another venue to stress and test concepts and future developments, such as Sea-Basing and Operational Maneuver from Strategic Distances (OMSD), that cross all types of operations. Other topics to be vetted within Irregular Warfare scenarios and wargames that span both regular and irregular operations include Joint Heavy Lift (JHL), Joint Interoperability and Network-Centric and Network-Enabled Battle-Command. Consistent and informed approaches to the process of developing analytically useful IW scenarios and wargames, coordinated across services, agencies and allied partners, have the potential to increase the effectiveness and expediency of future military operations.

The Scenarios and Wargaming Directorate (SWGD) of the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) is responsible for developing Army and Joint scenarios and applying them in various wargaming venues to facilitate TRADOC's developmental studies and experiments. Venues for TRADOC include all the major Battle-Labs and Learning Centers of the U.S. Army. This paper and associated briefing propose some best practices and lessons learned in the process of developing IW scenarios and wargames for use in the study, experimentation and analysis of current and future concepts and designs. Recent focus includes the development of Africa 1.0 - an IW scenario in the AFRICOM Area of Responsibility (AOR) that was co-developed by TRAC and the Marine Corps Combat Development Command (MCCDC) with comprehensive Joint Services, Inter-agency, and Multi-National participation.

Decision Framework for Design of a High-Fidelity Synthetic Environment supporting Unmanned Ground Vehicle Development an

AbstractID: 247

Dr. Niki C Goerger	**Dr. Joyce A Nagle**	**Ms. Victoria D Moore**
U.S. Army Engineer Research and Development Center	U.S. Army Engineer Research and Development Center	U.S. Army Engineer Research and Development Center
ATTN: MADN-SE, Systems Engineering, Bldg 752, Unit	72 Lyme Road	3909 Halls Ferry Road
West Point,NY 10996-1905	Hanover,NH 03755-1290	Vicksburg,MS 39180
845-938-3180	603-646-4161	601-634-4636
niki.c.goerger@erdc.usace.army.mil	joyce.a.nagle@erdc.usace.army.mil	victoria.d.moore@erdc.usace.army.mil

The vision of the Office of the Secretary of Defense (OSD) Joint Ground Robotics Enterprise (JGRE) is to support the development and fielding of a family of affordable and effective mobile ground robotic systems, develop, and transition technologies necessary to meet evolving user requirements, and serve as a catalyst for insertion of robotic systems and technologies into the forces structure. In keeping with this goal, we are developing a high-fidelity Vehicle Autonomous Navigation Environment (VANE) to facilitate design and assessment of unmanned ground vehicle (UGV) performance, particularly in the areas of mobility, obstacle and target detection, and navigation. The work is sponsored by OSD JGRE through the Robotic Systems Joint Project Office and leverages the U.S. Army Engineer Research and Development Center research, development, test, and evaluation program. As a means to design the VANE, we developed a decision framework incorporating cross-community stakeholder needs, UGV missions, and operational environments. The decision framework links functionality parameters, value models and metrics to generate and assess design alternatives for VANE. A cross-walk between alternatives, identified critical gaps, and missions was used to design and conduct future experiments. This paper will focus on development of the decision framework, VANE design alternatives and recommendations, and experiments.

Investigating Surveillance Strategies for Homeland Defense Against Air and Maritime Threats

AbstractID: 351

Ms. Cherie D Gott, USAF
NORAD - USNORTHCOOM / J84
250 Vandenberg St, Suite B016

Peterson AFB,CO 80914
719-554-3945
DSN: 692-3945
cherie.gott@northcom.mil

As NORAD celebrates the 50 year jubilee of the Bi-National agreement with Canada to protect our skies, the requirement for air surveillance is as pertinent as it ever was. With the May 2006 signing of the new agreement, NORAD also picked up a maritime warning mission; adding requirements for surveillance over thousands of square miles of ocean, inland lakes and seaways. This hefty burden for surveillance stands in contrast to an aging and incomplete sensor architecture.

Since the defining events of September 2001, the NORAD and US Northern Commands have given increased attention to evaluating the current and future surveillance needs against a redefined and broadened set of requirements. While we desire the equivalent of the all-seeing unblinking eye, the reality is that we must come up with an affordable sensor architecture in which individual elements can work together in a family-of-systems concept to provide adequate surveillance with minimal risk.

Developing a roadmap for such a sensor architecture necessitates having a well-defined, validated, set of requirements for which surveillance technologies and employment concepts can be vetted against. The analysis division within the NORAD and US Northern Commands' J8 Directorate is working to validate the surveillance requirements as well as to investigate and quantify the utility of emerging sensor technologies to meet those requirements. We will present our methodologies for these tasks and associated findings to date.

A Review of the MOE/MOP Literature: A Look at the Past to Help Today

AbstractID: 508

Mr. John M Green
Naval Postgraduate Scholl
16346 Santa Cristobal St.
San Diego,CA 92127
858-716-1319
FAX: 858-716-1319
jmgreen@nps.edu

In the evaluation of systems one of the most important tasks is the selection of the evaluation criteria. If this task is handled incorrectly the consequences can be disastrous anywhere from system acquisition to system operation.

Selecting evaluation criteria is a process that is not well understood. In an effort to bring enlightenment to those who would select evaluation criteria this paper reviews the literature of measures of effectiveness since it was first introduced by Morse and Kimball in their seminal work Methods of Operations Research published almost sixty years ago. It will discuss some of the key studies and papers written in the intervening years such as the Weapon System Effectiveness Industry Advisory Committee (WSEIAC) study (1965) and the Command and Control Evaluation Workshop conducted by the Military Operations Research Society (1985-86). In addition, work from individual contributors such as Russell Ackoff, Noel Sproles, and Dr. Walter Perry will be discussed. The paper concludes with a summary of common themes that may help the analyst of today solve the perplexing problem of evaluation criteria. The paper has an extensive bibliography.

Panel Discussion: "Report From the Front:" Joint Warfare Analysis from the Combatant Commander's Perspective

AbstractID: 380

Ms. Cindy Grier (Chair CG C), USA
TRADOC Anlysis Center
255 Sedgwick Avenue
Ft. Leavenworth,KS 66027
816-383-1425
Cindy.Grier@us.army.mil

Ms. Rochelle (Co-Chair of CG C) Anderson, USA
TRADOC Analysis Center
255 Sedgwick Avenue
Ft. Leavenworth,KS 66027
913-684-7585
Rochelle.A.Anderson@us.army.mil

With joint forces from our combatant commands engaged in operations ranging from combat to humanitarian relief on a global basis, assessing their effectiveness is a broad and complex issue. This panel discussion will focus on the use of analysis at combatant command headquarters level and the analytic needs of our joint commanders. Senior representatives from combatant commands will discuss how OR is supporting them at the "tip of the spear," presenting a brief overview of how they are using analysis and how their analysis needs might be better met. The participants will reflect on the state of OR, where it is working effectively and where it may be falling short. The session will include a moderated discussion with the opportunity for attendees and panel members to interact.

Close Air Support C-IED

AbstractID: 297

1st. Lt Paul Griffith, USAF
AF/A9AF
1777 N. Kent Street
Rosslyn,VA 22209
703-588-8883
Paul.Griffith@pentagon.af.mil

Improvised Explosive Devices (IEDs) continue to produce the greatest number of coalition force casualties in Operation Iraqi Freedom (OIF).

One of the distinctive capabilities that the United States Air Force has brought to bear in the counter-IED (C-IED) fight is the precision engagement of time sensitive targets through the re-role of close air support (CAS) missions. In the fall of 2007, at least 20% of all CAS missions were re-roled to execute kinetic or non-kinetic actions against factories, caches, IED emplacers, or emplaced IEDs. This presentation will explore a methodology and statistical tests used to gain analytical insights into the contributions of various air actions in the C-IED fight as well as challenges and potential solutions to linking ground and air data for further analysis.

CENTCOM Airlift Network Analysis Using Supply Chain Guru™

AbstractID: 160

Dr. Greg Grindey
USTRANSCOM JDPAC
709 Ward Dr.
Scott AFB,IL 62225
618-220-5150
DSN: 770-5150
Gregory.Grindey.ctr@ustranscom.mil

As the U.S. Central Command continues to fight in Iraq and Afghanistan, the network of airlift support to the troops has evolved and continues to change as the requirements and force structure change. Since the beginning of the war when only organic (i.e. military) aircraft were used for delivery of passengers and cargo to the various locations in the AOR, a lot has changed including the availability of commercial transportation options for airlifting palletized cargo to some locations. Through the use of several commercial options including contracted lift and a tender bid system for military palletized cargo, CENTCOM has been able to reduce the number of organic aircraft needed to deliver sustainment and provide for the rotation of forces. While not all cargo is eligible for these commercial initiatives (hazardous and over/outsize shipments are excluded and all passengers must move on organic aircraft), currently approximately 50% of palletized cargo in the theater is moving on commercial aircraft.

To better understand the evolving capability mix and how best to use that capability, CENTCOM analysts have asked for reachback support from the U.S. Transportation Command's Joint Distribution Process Analysis Center. In attacking this problem, the JDPAC analysts have chosen to develop an optimization and simulation representation using a single data model of the CENTCOM airlift system with a commercial off-the-shelf product, Supply Chain Guru™. This package allows the user to create a common framework for the system that can provide an optimization approach for guidance on network structure and policies while allowing "what-if" analysis through a simulation representation as well. This model is in development and refinement for use in managing the drawdown of organic airlift assets, determining better route structures, assessing risk related to commercial and organic airlift mix choices, and evaluation of other potential courses of action. This presentation will describe the problem and the modeling approach taken and will demonstrate the types of analysis being done with the tool.

Optimal Aimpoints in the Presence of Target Location Error

AbstractID: 29

Dr. Don A Grundel, USAF
AAC/671st ARSS
102 West D. Ave, Ste 12
Eglin AFB,FL 32542
850-882-9417
don.grundel@eglin.af.mil

In an era of improved accuracy and smaller munitions, target location error is becoming a predominant factor in gaining effects on target. In fact, when multiple weapons are dropped on a single point-target, it may not be best to drop all weapons on a single aimpoint. The reason is target location error can result in a bias and, in fact, a pattern of aimpoints may be more effective. In the case where aiming and target location errors are normally distributed and the damage function is diffuse Gaussian which are reasonable and accepted assumptions in the case of GPS/INS guided blast-fragment munitions, a closed form function to calculate probability of kill for given aimpoints is available. This paper provides a vital extension by presenting an algorithm that determines the optimal number and pattern of aimpoints to achieve a minimum level of damage to a point target. The approach and results are validated with munition-target pairings using the Joint Weaponeering System.

Space Analysis Resource Portal (SARP) and the Authoritative Data (AD) functionality

AbstractID: 215

Ms. Kathy M Gue, USAF
HQ AFSPC/A9
250 Vandenberg St
Peterson AFB,CO 80914
719-556-3803
DSN: 834-3803
FAX: 719-556-3738

Dr. Lee L Leber, USAF
AFSPC/A9-Scitor Contractor
745 Space Center Drive
Colorado Springs, CO,CO 80915
719-380-4109
DSN: NA
FAX: 719-380-4001

Ms. Kathie Reece, USAF
AFSPC/A9-DSoft Technology Contractor
7222 Commerce Center Drive, Suite 165
Colorado Springs,CO 80919
719-598-7107
DSN: NA
FAX: 719-219-0800

kathleen.gue@afspc.af.mil	lleber@scitor.com	kathier@dsoft-tech.com

Air Force Space Command (AFSPC), Directorate of Analysis, Assessment, and Lessons Learned (A9) has created a Space Analysis Resource Portal (SARP) to support space operators, analysts, and planners. During our presentation, we will overview the goals for the SARP, showcase its contents, share challenges in populating the Portal with current and useful information, and attempt to garner user requirements and recommendations on how to make it more useful to the space community.

SARP supports registered users and provides the capability to store detailed information about space models and simulations and studies associated with those models/simulations. We are currently working with internal and external organizations and commercial companies to update SARP with model, study, and space data information. There are 49 M&S models/tools listed in SARP and we want it to provide current and usable databases, tool overviews, and lessons learned to the space community. The purpose of the Authoritative Data (AD) functionality within SARP is to provide analysts, testers, trainers, system acquirers, wargamers, and exercise planners with authoritative space system information and data. The Portal is available on both the Non-secure Internet Protocol Router (NIPRNet) -https://halfway.peterson.af.mil/SARP - and the Secret Internet Protocol Router Network (SIPRNet) - https://sarp.afspc.af.smil.mil - components.

During our presentation we will overview SARP's content to include its hyperlink capabilities, database interfaces, study reports, user and specific space metrics and ways it can support quick-turn analyses. We will also facilitate discussion s regarding potential sources and possible opportunities to pull data from AD sources, push current data to space related databases, and recommendations regarding interface designs to support space analysts and planners.

Simulation Modeling of CONUS Ammunition Logistics

AbstractID: 448

Mr. Dave Gvozdic
LLamasoft Inc
206 South Fifth Avenue, Suite 400
Ann Arbor,MI 48104
734-418-3119
jaime@llamasoft.com

Traditionally, it is a time consuming and tedious process to use and off the shelf simulation package and adapt it to the unique needs of a military environment. However, current software advances in conjunction with a rapid software development have led to a much more user friendly analytical tool without sacrificing the detailed simulation processes. One such project included an effort between the OSD PA&E office and LLamasoft. Initially tasked with the mission to simulate ammunition movements from depots to primary POEs to theatre, a combined effort recognized several unique areas which needed to be developed within the software. As a team, there was a four phase approach to successful modeling application. Phase 1 included conducting ammunition process analysis at each of 8 primary depots to determine outflow capability. Phase 2 involved conducting ammunition loading/unloading process analysis at primary POEs to determine Class V time spent in POE. Phase 3 combined phases 1 and 2 with theater demand points to determine cycle time, service rates, and potential bottlenecks based on resource availability. Last, phase 4 involved scenario analysis to examine impact of reallocating assets, highly variable demand patterns, and different supply lanes. This project involves unprecedented modeling to allow for stochastic determination of new POE locations based on new ammunition weight, utilization, and priority; hierarchical transportation assets with continuous visibility on transportation assets; and finally, it will enable modeling of a process where a container can be modified during transit, not just at it final or start location.

Parametric Analysis of Target Tagging Effects on Irregular Warfare

AbstractID: 275

Ms. Susan Hanson	**Mr. Justin Nave**	**LTC John Crino, USA**
The MITRE Corporation	The MITRE Corporation	OSD PA&E Simulation and Analysis Center
7515 Colshire Dr	7515 Colshire Dr	1401 Wilson Blvd
McLean,VA 22102	McLean,VA 22102	Arlington,VA 22209
703-983-1910	703-983-6000	703-696-9360
shanson@mitre.org	jnave@mitre.org	john.crino@osd.mil

During the 75th MORS Symposium, several briefings regarding the Combating WMDs scenario were presented by the Simulation and Analysis Center (SAC). The Combating WMDs Study was a collaborative effort to create an analytical baseline with insights into the challenges and capabilities associated with locating, containing, and neutralizing unsecured nuclear devices in a weak permissive environment.

A number of excursions and sensitivity analyses were suggested by the SAC as potential routes for further examination and exploration. One of the parameters of interest to the Analysis Community was to understand the effects of tagging a high value target and measure its contribution to the overall warfight. This briefing will discuss the process of setting up a quick-turn analysis based on a pre-existing Combating WMDs scenario and executing rapid excursions. Further, it will investigate the results and insights gained from parametrically adjusting the architectural effectiveness of tracking a tag to measure the critical warfight metrics responses.

If…Then…Now What: Analysis of Dynamic C4ISR Effects on Conventional Combat

AbstractID: 283

Ms. Susan Hanson
The MITRE Corporation
7515 Colshire Dr
McLean,VA 22102
703-983-1910
shanson@mitre.org

LTC John Crino, USA
OSD PA&E Simulation and Analysis Center
1401 Wilson Blvd
Arlington,VA 22209
703-696-9360
john.crino@osd.mil

Mr. Chuck Burdick
Lockheed Martin
1401 Wilson Blvd
Arlington,VA 22209
703-696-9360
chuck.burdick@lmco.com

"What is a pound of C4ISR worth?", "What will this do for the man on the ground?", "I have this new capability… So What?". These are all questions that have been rattling around the Analytical Community for years. Many people recognize that technological advances in C4ISR will undoubtedly improve the DoD's ability to perform, but the question that always remains is "By how much?". It is simple to do first order trade-offs, and sometimes even second order. But what are the higher order effects? How do the trade-offs work for the Joint Forces of tomorrow? How can we as analysts take into account a clever opponent that can choose different CONOPs based on perception (as we always allow for with ourselves)?

The recently developed JAS CC-2 LR scenario has synchronized the inputs and assumptions from multiple mission and campaign CC-2 analysis efforts to generate a consolidated CC-2 scenario, which incorporates stochastic ISR and perception, dynamic CONOPs, I&W, responsive command and control, communications routing and rerouting, and unconventional warfare effects. This briefing will discuss how the C4ISR components were modeled and implemented, and analyzed; addressing how, where, and to what degree the effects impact the scenario metrics.

The Economics of Roadside Bombs

AbstractID: 354

Mr. Matthew Hanson
College of William & Mary/Institute for Defense Analyses
CSU 0304, P.O. Box 8793
Williamsburg,VA 23186
703-599-7785
mahans@wm.edu

The U.S. military has been criticized for its failure to stop the Iraqi insurgency's use of improvised explosive devices (IEDs), which have caused most of the Coalition casualties. We use an instrumental variables approach to estimate the insurgent responses to U.S. military countermeasures. We find that insurgents increase the number of IED attacks when IEDs are made less effective, but that the insurgents' overall capacity to inflict damage decreases. These results suggest that a major benefit of IED countermeasures comes in reducing non-IED attacks, which decrease 2% with every 1% decrease in IED effectiveness. Previous evaluations of the U.S. military's $13 billion counter-IED effort have thus significantly understated its success.

Small UAS Analysis of Laser Designation and Search and Target Acquisition Capabilities in an Urban Environment

AbstractID: 51

Mr. Eric S Harclerode, USA
Army Materiel Systems Analysis Activity
392 Hopkins Rd
Aberdeen Proving Ground,MD 21005
410-278-9310
DSN: 298-9310
FAX: 410-278-4694
eric.harclerode@us.army.mil

Mr. Stephen L Colegrove, USA
Army Materiel Systems Analysis Activity
392 Hopkins Rd
Aberdeen Proving Ground,MD 21005
410-278-6231
DSN: 298-6231
FAX: 410-278-4694
stephen.colegrove@us.army.mil

At the request of TRAC, AMSAA analyzed the performance of a Small Unmanned Aerial System (UAS) using the Fusion Oriented Communications, Computers, Command and Control, Intelligence, Surveillance, and Reconnaissance (C4ISR) Utility Simulation (FOCUS). The objective of the analysis was to assess the ability of the UAS to laser designate targets and to compare the ability of a fixed-wing UAS to a rotary-wing UAS to acquire targets in urban terrain.

FOCUS is being developed by AMSAA and is an entity-level, event driven, stochastic C4ISR simulation. FOCUS was used to model the UAS and associated sensors, the target set, the laser guided munition, and urban terrain.
To assess laser designation performance, the UAS was modeled to track a target, moving or stationary, for 5 minutes and then to designate for at least 30 seconds. During the designating time, the Night Vision Laser Designation Model was run for every laser pulse until the guided munition reached the target. To compare the target acquisition abilities of fixed-wing and rotary-wing UAS, an intersection surveillance mission was conducted with the fixed-wing UAS flying a circular orbit and the rotary-wing UAS hovering in several positions around the area as personnel and vehicle targets passed through the intersection. The perch-and-stare capability of the Small UAS was also modeled.

In the laser designation of a moving target vignettes, lock-on success during the lasing period was evaluated, confirming the difficulty of designating a moving target in urban terrain. A sensitivity analysis revealed that increasing the altitude at which the UAS flies or decreasing the ground standoff range from the target can increase performance to acceptable levels. Given line-of-sight, laser designation of a stationary target has near perfect success. Comparing the performance of a fixed-wing UAS and a rotary-wing UAS to acquire targets in an urban environment suggests that the rotary-wing UAS outperforms the fixed-wing UAS in high density terrain, but performs equally in medium density terrain. However, if a UAS with the ability to perch-and-stare were given a sensor with an appropriately wide field of view, this capability can outperform flights at the operational altitude.

Training in a Net-Centric Environment

AbstractID: 377

Mr. Fred Hartman
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311-1882
703-578-2776
FAX: 703-931-7792
fhartman@ida.org

Over the last decade the Department of Defense (DoD) has made a significant investment in the Global Information Grid (GIG) with several omnibus programs building in spirals to achieve full operational capability. Two of these, which are key to the success of future training modeling and simulation (M&S) applications and on line training tools, are the Net Centric Enterprise Services (NCES) and Net Enabled Command and Control (NECC) Programs. The NCES program provides the "services" layer of the GIG and NECC provides the net-centric data strategies and command and control architectures. As the DoD migrates to the GIG environment current policy requires migration to net-centric data and applications architectures which are being built to a Services Oriented Architecture (SOA). The advantages of SOA to our training community are by definition, found in architectures that govern all aspects of creating and using operational training processes, packaged as web services, throughout their life cycle, as well as defining and provisioning the data infrastructure. In this SOA environment opportunities abound for future training federations that can be rapidly composed with functional simulation modules using and reusing common scenarios and tactical or technical weapons data. This paper and briefing will build on the evolution of early client-server environments in the age of mainframe computing, the modular programming techniques pioneered by the original SIMSCRIPT simulation language, and the move to interoperable, distributed training simulation federations associated with High Level Architecture (HLA) and Test and Training Enabling Architecture (TENA). Two of the findings of the Training Capabilities Analysis of Alternatives (TC AoA) completed in July 2004 were centered on the need to provide a rapid scenario generation capability for mission rehearsals and training exercises, and the need for a robust federated environment to pull together simulation modules and on line training tools in a live, virtual, constructive training environment. The GIG will provide the SOA and emerging common infrastructure that will permit us to achieve the long sought goals to enable simulation and data reuse and achieve more efficient and effective training and operations.

Kill Chain Analysis for Naval Special Warfare (NSW) Weapons, Platforms, and Sensors

AbstractID: 519

Dr. Chris Hase
WBB Consulting
4429 Bonney Road, Suite 400
Virginia Beach,VA 23462
757-213-8170x1844
chase@wbbinc.com

The acquisition process within the Department of Defense relies heavily on determining requirements against enemy threats and conducting analysis on capability gaps between current systems and current/future threats. This study explores new territory in developing a process that assesses a family of NSW systems and their ability to defeat or break the enemy's kill chain. Conducting sensitivity analysis on various system attributes informs decision makers on where best to spend limited development dollars. Most kill chain analysis conducted for the Department of Defense explores U.S. and Allied systems with an objective of making the kill chain more effective and efficient. This study is unique in modeling the kill chain from the opposite perspective and addresses the following question: What capabilities best allow U.S. and Allied weapons, platforms and sensors to defeat an enemy's kill chain? Built on the NSW operator's perspective, this study developed and tested a groundbreaking model to assess the value of different capabilities in their ability to break the enemy kill chain. Traditional kill chain analysis focuses on the back end of a detect, identify, track, target, engage, and assess kill chain with weapon systems seeking to improve the target and engage capabilities. From a NSW perspective, this study found investments in capabilities to defeat the kill chain as early as possible provide the greatest benefit. This study was instrumental in providing the NSW community an additional analytical tool useful in determining future requirements that affect platform development.

The Impact of Route Clearance Teams on Coalition Force Operations

AbstractID: 382

Mr. Clarence K Haubner, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-4486
DSN: 258-4486

FAX: 575-678-8379
ken.haubner@us.army.mil

Irregular warfare and the extensive use of Improvised Explosive Devices (IEDs) in Operation Iraqi Freedom (OIF) have changed the modern battlefield. The use of Route Clearance Teams (RCTs) has become essential to maintaining freedom of maneuver for Coalition Forces because of their role in finding and clearing IEDs. These teams are engaged in a continuous action-reaction-counteraction cycle with an adaptive Threat who exploits Coalition Force patrolling patterns to emplace IEDs. Under direction and guidance from the Joint Improvised Explosive Device Defeat Organization (JIEDDO), the TRADOC Analysis Center at White Sands Missile Range (TRAC-WSMR) is examining how Coalition Forces employ and utilize route clearance teams and equipment across OIF. We are investigating operational patterns exhibited by the route clearance teams and evaluating how the employment and distribution of route clearance equipment can be modified to enhance their contribution to the Counter-IED fight. This presentation describes the methodology, data sources, and products resulting from the JIEDDO sponsored effort to analyze Coalition Force route clearance capabilities.

Integrated Logistics Analysis Plan Future Combat Systems Medical Evacuation Study Report for Omni Fusion 2006

AbstractID: 85

Mr. GEORGE W HAUSLER, USA
CENTER FOR ARMY MEDICAL
DEPARTMENT STRATEGIC STUDIES
1608 STANLEY ROAD, SUITE 47
FORT SAM HOUSTON,TX 78234
210-221-2644
DSN: 471-2644
FAX: 210-295-0229
george.hausler@amedd.army.mil

Mr. Michael J O'Connor, USA
Center for AMEDD Strategic Studies
1608 Stanley Rd, #47
Fort Sam Houston,TX 78234
210-221-0209
DSN: 471-0209
FAX: 210-295-0229
michael.j.oconnor@amedd.army.mil

Mr. Ray Devore, USA
Center for AMEDD Strategic Studies
1608 Stanley Rd, #47
Fort Sam Houston,TX 78234
210-221-0228
DSN: 471-0228
FAX: 210-295-0229
ray.devore@amedd.army.mil

Mr. Pat McMurry, USA
Center for AMEDD Strategic Studies
1608 Stanley Rd, #47
Fort Sam Houston,TX 78234
210-221-9404
DSN: 471-9404
FAX: 210-295-0229
pat.mcmurry@amedd.army.mil

LTC Lawrence V Fulton, USA
Center for AMEDD Strategic Studies
1608 Stanley Rd, #47
Fort Sam Houston,TX 78234
210-295-8632
DSN: 421-8632
FAX: 210-295-0229
lawrence.fulton@amedd.army.mil

The Integrated Logistics Analysis Program Future Combat Systems (FCS) Medical Evacuation Study Report documents the analysis performed by the Center for Army Medical Department Strategic Studies (CASS) on the Omni Fusion 2006 experiment. The Army Medical Department Center and School's goal for the experiment was to determine if the medical evacuation assets for the FSC Brigade Combat Team (FBCT) could evacuate all medical casualties within target time limits. Because human variability is not scientifically reproducible and is a factor of each individual role player's skill level, CASS analysts developed a methodology for post-hoc analysis, which used only the casualty data generated within Human-In-The-Loop experiments and eliminated all other human processing. CASS implemented this methodology in a model, which simulates the evacuation process, allows the evacuation process to run to completion, allows multiple replications, adds treatment capability, and provides the ability for further statistical analysis.
Although the data collected was imperfect, this analysis showed the FBCT did not have sufficient medical evacuation assets to evacuate all medical casualties within target time limits for the given scenario.

Documenting Unmanned Aerial System (UAS) Tactics, Techniques and Procedures (TTPs)

AbstractID: 75

MAJ John J Herrman, USA
Headquarters, 25th Combat Aviation Brigade, 25th Infantry Di
.
Wheeler Army Airfield ,HI 96857
808-656-6663
john.j.herrman@us.army.mil

CPT John Sewart, USA
Headquarters, 25th Combat Aviation Brigade, 25th Infantry Di
.
Wheeler Army Airfield ,HI 96857
808-656-6663
john.thomas.sewart@us.army.mil

The 25th Combat Aviation Brigade (CAB), during Operation Iraqi Freedom 06-08, integrated sensor platforms (Unmanned Aerial Vehicles [UAVs]), with shooter platforms (Attack Aviation) and an added enablers (maneuver forces or additional sensors), all synchronized by a unified command and control element to improve lethality. The study documents and compares the lethal efficiency of shooters, sensor-shooters and the sensor-shooter-enabler triad (lightning strike). The study reveals that the 25th CAB, with attack helicopters (shooters), had a lethal efficiency ratio of 80%. Through the integration of sensors to the shooter (sensor-shooter) the 25th CAB was able to improve lethality by 3%. However, when the 25th CAB added one more enabler (lightning strike) with a unified command and control element the lethality of the organization improved to 95%. This paper examines the data collected during OIF rotation 06-08, through a statistical analysis process to highlight best practices for integration of sensor platforms with shooters and how added enablers increase the lethality of the organization thereby substantiating a new Tactic, Technique and Procedure (TTP) for UAS teaming.

Information Assurance Test and Evaluation Process: An ATEC Perspective

AbstractID: 515

Mr. Dwayne T Hill, USA
US Army Test and Evaluation Command (ATEC)
4501 Ford Avenue
Alexandria,VA 22302
703-681-2749
DSN: 761
FAX: 7036816914
Dwayne.Thomas.Hill@us.army.mil

Ms. Melanie Miller, USA
US Army Test and Evaluation Command (ATEC)
4501 Ford Avenue
Alexandria,VA 22302
410-278-1489
DSN: 738
Melanie.L.Miller@us.army.mil

Joint Vision 2020 will be achieved with the introduction of a wide range of new technologies that will support network centric warfare, from the Joint Tactical Radio System to Unmanned Ground Vehicles. The Net Ready Key Performance Parameter (NR-KPP) has been established in part to ensure that these new systems will seamlessly integrate into a net centric environment. Information Assurance as a component of the NR-KPP must be assessed on a recurring basis to provide the warfighter with an understanding of their capabilities and limitations to protect and restore their data and information from corruption, as well as their ability to detect and appropriately react to corruptions in data. The challenge to the Test and Evaluation (T&E) community is to first understand the Warfighter's Information Assurance requirements and then develop strategies to evaluate it. This presentation will provide an overview of the process used to develop an integrated system-of-systems test and evaluation strategy, and ATEC's IA assessment methodology.

A System-Impact Product for Space Situational Awareness: Validation of Spacecraft Surface Charging Specification

AbstractID: 216

Dr. Robert V Hilmer, USAF
Air Force Research Laboratory/RVBXR
29 Randolph Road
Hanscom AFB,MA 01731
781-377-3211
DSN: 478-3211
FAX: 781-377-3160
Robert.Hilmer@Hanscom.af.mil

Mr. Stephen Quigley, USAF
Air Force Research Laboratory/RVBXR
29 Randolph Road
Hanscom AFB,MA 01731
781-377-9666
Stephen.Quigley@Hanscom.af.mil

Specifying and forecasting the effects of the near-earth space environment on Department of Defense weapons, navigation, communications, and surveillance systems is required to achieve complete Space Situational Awareness (SSA). The Space Weather Center of Excellence of the Air Force Research Laboratory (AFRL/RVBX) and the Technology Applications Division of the Space and Missile Systems Center (SMC/SYAG) have jointly developed operational system-impact products for the Air Force Space Command (AFSPC) SSA Environmental Effects Fusion System (SEEFS). Projects currently undergoing development for real-time operations include a SEEFS architecture and database, five system-impact products, and a high-level decision aid product. The products include real-time space environment data displays and output from environment models. Within SEEFS, the Satellite Charging/Discharging (Char/D) system impact product combines observations and modeling of a wide energy range of charged particles in the magnetosphere to create tailored system-impact decision aids related to the specification and forecast of both surface and deep charging of satellites. Potential benefits include preparing for space environmental consequences; enhancing anomaly resolution timelines; decreasing system downtime and improving satellite operations planning and execution. This presentation will provide a general overview of the SEEFS program and present validation details for the performance at geosynchronous orbit of the spacecraft surface charging algorithms contained within the Char/D product.

Joint Airspace Command and Control in Defense Planning Scenarios

AbstractID: 386

Mr. Donald W Hinton, USA
US Army TRADOC Analysis Center
255 Sedgwick Ave
Ft Leavenworth,KS 66027
913-684-9292
DSN: 552-9292
FAX: 913-684-9288
donald.hinton1@us.army.mil

US and coalition airspace use is skyrocketing. Air vehicle proliferation has forced changes to Joint airspace command and control. The efficient use of airspace is critical to any Joint force commander, whether engaged in major combat operations or stability and security operations. Yet the command and control of airspace is not addressed in Defense Planning Scenarios or Multi Service Force Deployment documents. Command and control of airspace is rooted in Joint force command and control. Airspace command and control will continue to be an ever increasing portion of Joint force command and control. The evolution of Joint airspace command and control is yet to be captured in current doctrine. Joint tactics, techniques and procedures are newly published. The application of Joint airspace command and control best practices must be applied to future scenarios. Airspace users have an increasing opportunity to turn the tide in operations across the spectrum of military operations. The future Joint force must be able to assess the effect of varied airspace users.

Modeling and simulation of Joint force operations depends on analysis rooted in credible Joint scenarios. In accordance with DoD guidance,

Joint force and service analysts normally seek Defense Planning Scenarios to establish scenario credibility. TRADOC Analysis Center at Fort Leavenworth (TRAC-FLVN) has created a method to incorporate Joint airspace command and control procedures within a futuristic Defense Planning Scenario. The effort includes participation with US Navy, US Air Force and US Army experts. Our most current Joint airspace command and control principles are imbedded within TRADOC Analysis Center scenarios. These robust scenarios make TRADOC Analysis Center astutely prepared to evaluate the most complex future airspace issues in upcoming studies. This briefing will demonstrate how the Joint planning process is applied to an existing Defense Planning Scenario to construct a Joint Airspace Control Plan and create nested functional component airspace orders augmenting the Defense Planning Scenario.

An Analytic and Functional Decomposition of Battle Command to Enable Cross Command M&S Development

AbstractID: 200

Mr. Brian K Hobson
Booz Allen Hamilton
1122 North Second Street
Leavenworth,KS 66048
913-680-6577
hobson_brian@bah.com

In March 2003, the DUSA(OR) tasked the PM FCS M&S Management Office (MSMO) to ensure compatibility among the respective M&S capabilities of TRADOC, RDECOM, ATEC, and the FCS Lead Systems Integrator (LSI) to support development and acquisition of the FCS Brigade Combat Team (BCT) System-of-Systems (SoS). The engine for change is the Cross Command Collaboration Effort (3CE).

The purpose of 3CE is to develop a M&S and data collaboration environment for design, development, integration, and testing of capabilities, systems, and prototypes. 3CE integrates and provides a common environment that is documented and controlled in the 3CE Knowledge Repository (KR). The 3CE environment will eventually satisfy the common requirements of all participants to conduct distributed DOTMLPF development.

The 3CE process for capability development is one that enables development and integration of technical solutions across commands to support a program's acquisition lifecycle. The foundation of the 3CE capability development process is the functional decomposition process – a process that is based on systems engineering principles, yet is founded in reality. Underpinned with analytic requirements, the 3CE functional decomposition process drives cross command design and development based on analyst and evaluator requirements. Utilizing DoDAF products and standard cross command analytic requirement documents, the 3CE functional decomposition provides a relevant and credible requirement set that is explicitly linked to operational use cases and is at a level of fidelity for efficiently transitioning into the design phase.

3CE has executed its cross command functional decomposition process to identify detailed analytic and operational requirements that will support Future Combat System (FCS) Spinout events and activities. This paper focuses on the development and implementation of the 3CE functional decomposition process related to battle command activities, and also offers alternative uses for 3CE functional decomposition battle command products to assist ATEC, RDECOM, and TRADOC command planning in support of training, testing, and experimentation activities related to battle command across the FCS Program.

Techniques to Reduce Variance in Combat Modeling Results

AbstractID: 383

Ms. Sarah Holden, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-1607 DSN: 258-1607
FAX: 575-678-8074
sarah.holden@us.army.mil

Ms. Cynthia Acord, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-1300 DSN: 258-1300
FAX: 575-678-8074
cynthia.acord@us.army.mil

Variance is defined as the measure of its statistical dispersion, indicating how far from the expected value its values typically are. In the design and analysis of simulation experiments, it is difficult to estimate model performance parameters with adequate precision at an acceptable computing cost. Combat models may contain variability brought about by stochastic processes associated with, for example, weapon system performance data, sensor acquisition, maneuver, and processes attributable to networked fires. Due to the randomness of many of these processes, care must be taken when analyzing aggregated metrics. Trade-offs exist between the number of simulation model runs necessary to measure statistical and operational differences between alternatives and the resource constraints of the study. Additionally, the analysis must include execution of a sufficient number of replications to reduce the amount of stochastic noise typically seen in large-scale models while building required statistical confidence.

This study approaches this problem by exploring a variety of non-traditional variance reduction techniques to determine the model performance estimators with the smallest variance. This presentation will highlight the methodology employed and provide an exemplar used in determining the number of model runs required for analysis. In doing so, leaders, managers, and analysts will be able to more appropriately

inform decision makers about the statistical significance of their study results.

Evaluation of the Joint Service Lightweight Standoff Chemical Agent Detector

AbstractID: 31

Mr. Charlie Holman, USA
US Army Evaluation Center
4501 Ford Avenue
Alexandria,VA 22315
703-681-3376
DSN: 761-3376
FAX: 703-681-3365
Charlie.E.Holman@ATEC.Army.Mil

Mrs. Georgeann Winslow
SURVICE Engineering
4695 Millennium Drive
Belcamp,MD 21017
410-273-7722
Georgeann.Winslow@survice.com

Mr. Robert L Berkowitz
VRC Corporation
4501 Ford Avenue
Alexandria,VA 22302
703-578-1107
FAX: 703-578-0442
Robert.Berkowitz@ATEC.Army.Mil

In accordance with public law and treaty, the U.S. government is constrained on releasing chemical warfare agents in open air field tests. Hence, it is illegal to test chemical detectors in a realistic operational environment using chemical warfare agents. The evaluation of JSLSCAD detection performance involves integrating results from four different types of events. These events are: (1) operational field test using war-fighters and simulants, (2) developmental field tests using simulants, (3) developmental laboratory tests using both chemical warfare agents and simulants, and (4) modeling and simulation. Each individual event of the evaluation has substantial limitations, and by itself, would not adequately form the basis of the JSLSCAD performance evaluation. These limitations are discussed. Field tests and laboratory tests provided a base for validation, verification, and accreditation of the modeling and simulation. The process of using and combining the results of these four separate events to depict JSLSCAD performance is discussed.

Using Cyber Intelligence Preparation of the Environment for Computer Network Defense

AbstractID: 471

Ms. Mary Horejs
Department of Defense
9800 Savage Road, Suite 6329
Fort Meade,MD 20755-6329
240-373-1785
FAX: 240-373-1788
mahorej@nsa.gov

Mr. Jeffery Markey
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-872-2727
jeffery.p.markey@saic.com

Mr. Galo Medina-Ortiz
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3761
galo.h.medina-ortiz@saic.com

Dr. Christopher Degni
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3756
degnic@saic.com

Cyber attacks against the United States' critical infrastructure are becoming acknowledged as a serious threat in addition to kinetic or physical attack. The Cyber Intelligence Preparation of the Environment (CIPE) Analytic Framework (CAF) can be applied to help the decision maker protect our nation's critical infrastructures by evaluating a specific adversary's critical capabilities and avenues of approach. For the purposes of Computer Network Devense (CND), the CAF has been expanded to include blue force resources, risk, and cost benefit analysis. This presentation details the CAF methodology, process, and results from applying CAF to this CND problem. It includes a discusion of a hypothetical adversary's attempt to gain knowledge of Maryland's electric power distribution network.

The Cyber Threat Assessment Matrix: A Methodology for Prioritizing Cyber Threats

AbstractID: 478

Ms. Mary Horejs
Department of Defense
9800 Savage Road, Suite 6329
Fort Meade,MD 20755-6329
240-373-1785
FAX: 240-373-1788
mahorej@nsa.gov

Mr. Jeffery Markey
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-872-2727
jeffrey.p.markey@saic.com

Mr. Galo Medina-Ortiz
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3761
galo.h.medina-ortiz@saic.com

Dr. Christopher Degni
Science Applications International Corporation
7120 Columbia Gateway Drive
Columbia,MD 21046
410-312-3756
degnic@saic.com

The Cyber Threat Assessment Matrix is an all-inclusive list of cyber threats, including nation states, independent transnational groups, and

threat technologies. This matrix will prioritize cyber threats to enable effective resource allocation. The development of such a matrix requires a ranking framework that takes into account unique cyber threat characteristics, while addressing the key elements of threat: intent, knowledge, skills, ability, and access. All of these threat characteristics of threat must be compiled to evaluate a comprehensive view of an adversary's overall threat to a particular blue force system. This presentation will detail the threat assessment methodology and process for creating this ranking, as well as the threat analytic framework, with geospatial orientation, underpinning it.

Determining Connectivity in the Advanced Warfighting Simulation (AWARS)

AbstractID: 364

Mr. Robert Horton, USA
TRADOC Analysis Center - Ft. Leavenworth
255 Sedgwick Avenue
Ft. Leavenworth,KS 66027-2345
913-684-9261
DSN: 552
FAX: 913-684-9232
robert.hortonii@us.army.mil

Ms. Shaynah Schnelle, USA
TRADOC Analysis Center - Ft. Leavenworth
255 Sedgwick Avenue
Ft. Leavenworth,KS 66027-2345
913-684-9315
DSN: 552
FAX: 913-684-9232
shaynah.schnelle@us.army.mil

AWARS is a Joint Task Force level, deterministic, multi-sided, event-driven simulation representing system-on-system effects in an aggregate manner. Battle-command in AWARS is plan-driven and communications-enabled. Therefore, it is critically important to represent communications properly in AWARS. Messages arriving too late, or not at all, can greatly influence the course of a battle. Existence of connectivity and the time required for transmission and processing of messages all influence the effectiveness of battle command. The aggregate nature of AWARS precludes modeling individual communications systems and, therefore, the TRADOC Analysis Center developed a new algorithm and approach. This presentation discusses the methodology for determining unit-to-unit connectivity and the testing process used to verify the methodology. Modeling connectivity allows AWARS to be used in information operations studies and network design Analyses of Alternatives.

Economics of Speed in Military Applications

AbstractID: 267

Mr. Christian T Host
Boeing
5 Single Lane
Wallingford,PA 19086
610-591-5883
Christian.T.Host@Boeing.com

Increasing aircraft speed provides operational and economic benefits to the operators. Completing the mission sooner not only improves operational effectiveness, but may also reduce the total mission costs. Often the hourly costs may increase with extra speed, but not necessarily the total cost, since the mission is executed in less time. Both the operational benefits and costs depend on the mission flown, making ¡§a priori¡¨ calculations of value (benefit per dollar) impossible. Consequently military (transport/patrol) aircraft designers and operators lack critical information when trying to create a business case for investing in technology that improves speed.

This presentation presents a way to calculate the savings provided by speed, which could be used to offset possible increases in operating costs of the faster aircraft. Meaningful insights emerge by simulating a full spectrum of military missions using the AIRPLAN„¦ Mission planning software package, wrapped by a Monte Carlo driver. Tens of thousands of different missions are analyzed by varying sixteen different variables for the transport missions (Airspeed, Radius, Initial Payload to Transport, Headwind, Sustainment Payload per Day, Days of sustainment, Operations and Support Costs per Hour, Additional Crew Costs per Hour, Main Operating Base Taxi Time, Forward Operating Base (FOB) Taxi Time, MOB Load/Unload Time, FOB Load/Unload Time, Maximum Crew Duty Day, Minimum Crew Rest Period, Briefing Time, Debrief Time). Eleven different independent variables are varied for loiter missions (Airspeed, Patrol Radius, Baseline Aircraft Endurance, Faster Aircraft Endurance, Maximum Crew Duty Day, Minimum Crew Rest Period, O&S Costs per Hour, Additional Crew Costs per Hour, Aircraft Turn Around Time, Briefing Time, Debrief Time). Statistical analysis permits the construction of simplified parametric equations useful for acquisition analysis or product development. This presentation presents the full analysis and provides conclusions that are applicable to a wide range of missions.

First and Second Order Difficulties in Measuring and Ensuring Readiness

AbstractID: 135

Dr. Seth A Howell, USA
Center for Army Analysis
6001 Goethals Rd
Fort Belvoir,VA 22060-5230
703-806-5413
DSN: 656-5413
FAX: 703-806-5732
seth.a.howell@us.army.mil

Conventional warfare tests national military systems against military systems and the supporting institutions of Nations. In Irregular Warfare includes the capability of state and non-state to attack the institutions which support military systems. Reducing the readiness of a military system may become a means of attacking military systems without a system on system engagement. To maintain warfighting capabilities, the Army maintains a variety of sustainment programs, particularly depot maintenance and recapitalization programs. Determining the requirements for these programs is a formidable challenge. The challenges range from defining the term readiness at a fleet level to connecting budget requirements to Army readiness.

The Center for Army Analysis conducted a study to support identifying requirements and functions of programs relating to Army sustainment. The attempt to understand the connection between depot maintenance, recapitalization programs, and readiness articulates the difficulties in measuring equipment readiness at the fleet level. A brief statistical analysis provides a means to understanding which metrics for readiness can be legitimately used for simulation and modeling. Given the difficulties in defining equipment readiness at a fleet level, alternative metrics for readiness are explored followed by research on finding a best mix of recapitalization across multiple fleets.

The Center for Army Analysis has developed a mixed integer programming model, Multi-Fleet Analysis (MFA), to analyze recapitalization strategies over multiple fleets. The MFA methodology and model were modified to specifically address the recapitalization in airframes (UH60) and ground vehicles (M1). The model modifications resulted in two models: a spreadsheet model for individual fleets and an optimization across multiple fleets. The two models represent two different planning approaches: single fleet planning and multiple fleet planning. Ensuring readiness requires understanding the merits of the two approaches. While an attack against readiness may not be avoidable, the effects will be reduced by effective planning.

Quantitative Analysis of Historical Data on Irregular Warfare

AbstractID: 136

Dr. Seth A Howell, USA	**Ms. Justine Blaho, USA**
Center for Army Analysis	Center for Army Analysis
6001 Goethals Rd	6001 Goethals Rd
Fort Belvoir,VA 22060-5230	Fort Belvoir,VA 22060-5230
703-806-5413	703-806-5692
DSN: 656-5413	DSN: 656-5692
FAX: 703-806-5732	FAX: 703-806-5732
seth.a.howell@us.army.mil	justine.blaho@us.army.mil

Operational Research and System Analysts face the challenge of translating historical research, inherently a narrative, into quantifiable metrics. In particular, analysts face questions relating to loss of data by quantifying historical data, developing appropriate metrics for quantified historical data, and integrating historical data analysis into Operations Research methodologies, such as wargaming. The paper addresses the issues of quantifying the historical data and applying Operations Research Techniques (classification) to ambiguous data.

The Center for Army Analysis (CAA) has been collecting historical data on Irregular Wars through The Dupuy Institute, a historical analysis organization. This study addresses the issue on developing the appropriate metrics for studying quantified historical data. Metrics for classifying quantified historical data from the Center for Army Analysis Irregular Warfare database are explored. Through the process of classifying irregular wars, the interplay between categorical, ordinal, and numerical data resulting from the historical data quantification is articulated and explored. Using the data, each irregular war is viewed as a vector in a high dimensional space. The study takes a geometric approach to classification by focusing on the distance metric between insurgencies. Given the different types of data, the metric is necessarily non-Euclidean, presenting a challenge for describing the space of Irregular Wars.

Given an algorithm for classification, the study compares the results of the classification by the algorithm to classification using categories from Irregular War literature. An application of the classification to development and analysis of wargames is briefly described to address issues of how to apply historical analysis within Operations Research methodologies.

Measuring the Value of Information and its Relationship to Military Decision-Making

AbstractID: 375

LTC David Hudak, USA	**Dr. Alex Pogel**
TRADOC Analysis Center, TRAC-WSMR	Physical Science Laboratory, New Mexico State University
Bldg. 1401, Martin Luther King Avenue	P.O. Box 30002
White Sands Missile Range,NM 88002	Las Cruces,NM 88003
575-678-3668	575-646-9176
DSN: 258-3668	FAX: 575-646-5717
FAX: 575-678-8074	alex.pogel@psl.nmsu.edu
david.hudak@us.army.mil	

The U.S. Army and in particular the TRADOC Analysis Center (TRAC) have developed methodologies and algorithms to measure the quantity and quality of information that is available to military decision-makers. Using the Dynamic Model of Situated Cognition (DMSC) as a descriptive model of information processing and information flow, this research investigates the relationship of information to the decisions made in a combat scenario. This research applies a design of experiment (DOE) methodology in an agent-based model to capture the decisions made at the platoon leader level. The results of the modeling will compare an alternative with nearly perfect information available to alternatives that have varying amounts of information as a result of changes in sensor and network performance. Varying the performance

parameters provides a means to evaluate the amount and source of the information. The end result of this research is a mathematical model and response surface that can be used to assess the contribution of the factors (sensors, network) to the cognition of the decision-maker. Further, this model can be correlated to the decisions made at the platoon level.

This presentation will address the approach, methodology, agent-based simulation model, and emerging results of the research.

An Outbrief from the "Impact of Emerging Societies on National Security" Special Meeting

AbstractID: 158

Dr. John R Hummel Argonne National Laboratory 9700 S. Cass Avenue/DIS-900 Argonne ,IL 60439 630-252-7189 jhummel@anl.gov	**Dr. Theodore J Bennett, Jr.** Naval Oceanographic Office 1002 Balch Boulevard, N641 Stennis Space Center,MS 39522-5001 228-688-4148 theodore.j.bennett@navy.mil

Societies confront a wide range of nontraditional threats, including an occupation, major changes in energy supply and demand, introduction of new technologies, regime changes, natural or human induced catastrophes, and assimilation of new cultures. The reaction by a society to internal and external disruptions is a complex interaction of social, economic, political, environ-mental, and technological processes. These interactions operate in a synergistic fashion with one factor potentially triggering feedback loops between them. The result can be the emergence of a new societal state.

The concept of an “emerging society” refers to a change from one social state to another – not just a change from an “old” society to a “modern” one, as is often portrayed in the popular press. Very often, we only focus on “terrorists,” “non-state actors,” and failed states.” In this meeting, we will examine a large array of factors that can create emerging societies, such as ex-ogenous shocks to the environment (e.g., changing climate, weather patterns, and desertifica-tion), pandemics, shifts in cultural identify, economic factors, the assimilation of new cultures, etc.; and how these factors can have a National Security impact. Being able to characterize an emerging society and develop an appropriate response requires a deep understanding of these factors, as well as the history of the society.

In April of 2008, a MORS Special Meeting on theses topics was held at the Argonne National Laboratory. This paper is the out brief from that meeting.

Complex Adaptive System Comparative Analysis Dynamic Environment for Emerging Societies (CASCADE-ES)

AbstractID: 251

Dr. John R Hummel Argonne National Laboratory 9700 S. Cass Avenue/DIS-900 Argonne,IL 60439-4832 630-252-7189 jhummel@anl.gov	**Mr. John H Christiansen** Argonne National Laboratory 9700 S. Cass Avenue/DIS-900 Argonne,IL 60439-4832 630-252-3291 jhc@anl.gov	**Dr. Mark Altaweel** Argonne National Laboratory 9700 S. Cass Avenue/dis-900 Argonne,IL 60439 630-252-1379 maltaweel@anl.gov
Mr. Dariusz Blachowicz Argonne National Laboratory 9700 S. Cass Avenue/DIS-900 Argonne,IL 60439 630-252-6187 blach@anl.dis		

Societies are confronting complex interactions among social, economic, political, environmental, and technological processes that can result from a variety of factors; such as, major changes in energy supply and demand, introduction of new technologies, regime changes, natural or human induced catastrophes, and assimilation of new cultures. These interactions operate in a synergistic fashion with one factor potentially triggering feedback loops between them. These interactions result in new emerging societal situations in which the concept of an “emerging society” refers to changing from one social state to another – not just changing from an “old” society to a “modern” one, as is often portrayed in the popular press.

Models and tools exist for studying the impacts of many of the individual factors noted above. Powerful computational frameworks exist for integrating these models together in a flexible environment. Finally, the area of Complex Adaptive Systems provides the tools and models required to represent how the social players in these interactions (e.g., people and organizations) respond to dynamic changes. By being able to model these various factors in an integrated and synergistic fashion – and being able to rapidly compose and decompose the problems – will provide planners with the ability to rapidly study the interplay between these processes at various temporal and spatial granularities and examine the long term impacts of changes or events that initially occur on a short timeframe (e.g., natural catastrophe, spike in energy costs, etc.) and may require a prompt responsive action.

CASCADE-ES is a program designed to develop both processes and technologies to study the synergistic interactions that occur in integrated physical, social, and econominc environments. This paper provides an overview of how these procedures and tools can be applied to analyze the issues surrounding emerging societies operating in complex social and physical environments.

Maritime Domain Awareness: Process Reengineering

AbstractID: 442

Ms. Susan G Hutchins, USN
Naval Postgraduate School
589 Dyer Road
Monterey,CA 93943-5000
831-656-3768
FAX: 831-656-3679
shutchins@nps.edu

Dr. Shelley P Gallup, USN
Naval Postgraduate School
589 Dyer Road
Monterey,CA 93943-5000
831-656-1040
spgallup@nps.edu

Dr. Doug MacKinnon, USN
Naval Postgraduate School
589 Dyer Road
Monterey,CA 93943-5000
831-656-1005
djmackin@nps.edu

CAPT Scot Miller, USN
Naval Postgraduate School
589 Dyer Road
Monterey,CA 93943-5000
831-656-1132
scot.miller@nps.edu

Dr. Jared Freeman
Aptima, Inc.
1726 M Street, NW, Suite 900
Washington,CA 20036
202-842-1548
FAX: 202-842-2630
freeman@aptia.com

A complex mosaic of forces will affect maritime security through 2020. These include economic forces such as (i) illegal international migration–fueled by tremendous population increases in developing countries, (ii) drug smuggling, and (iii) weapons proliferation (Stubbs & Truver, 1999), as well as military threats posed by hostile states, failed states, and transnational organizations engaged in intelligence gathering or terrorist activities (White House, 1998). The President's National Security Strategy indicates that diverse threats such as these must be countered through an integrated approach: Maritime Domain Awareness (MDA). MDA will engage and shape this dynamic and expansive environment by detecting anomalies and deviations from established trends and patterns in commercial and military traffic, and enabling commanders to take appropriate action before security is compromised or crises erupt (DoN, 2007). In line with the theme for this year's symposium, expanding analysis for a more secure world, MDA encompasses a diverse set of organizations, complex processes, and a variety of analytic and collaborative tools. This research reported here will advance organizational structures, procedures and C2 technologies to enhance global MDA. Our approach is to document current MDA capabilities, compare them with the next phase of expected capabilities based on integrating new technologies, and document the gains.

The MDA Prototype Acceleration Project is focused on initial capability fielding of prototype tools developed to assist with various aspects of MDA. The Spiral 1 effort focuses on establishing a set of core net-centric capabilities that, at multiple levels of security, will feed and fuse many data streams into a coherent common operational picture for Spiral 1 assessment while providing improved analytical and collaboration tools. The purpose of this research is to develop a comprehensive assessment plan and conduct an assessment of the MDA Spiral 1 technologies and associated capabilities. This entails working with the MDA spiral 1 planners, functional area managers, site managers, labs, and test organizations involved with developing, validating, and assessing definitions, requirements, and designs and reporting test and evaluations activities for MDA FY08 Spiral 1.

Design of Experiments Overview

AbstractID: 530

Mr. Gregory T Hutto, USAF
46 Test Wing
Room 226, Building 1
Eglin AFB,FL 32542
850-882-4646
DSN: 872-4646
FAX: 850-882-9512
huttog@eglin.af.mil

For the past 10 years, the Air Combat Command's 53 Wing, and now the 46th Test Wing have been using Design of Experiments (DOE) as its principal method of test, with great success. Benefits include faster tests, fewer test resources, and greater system understanding all while increasing the confidence in test results. From digital simulation to engineering-oriented hardware-in-the loop, to operational flight test, we're now using DOE in nearly all tests. This one- hour tutorial will introduce attendees to DOE -- a powerful methodology for test and evaluation. We address the history of DOE, compare it to other popular test strategies, and describe a four-step process to simultaneously deal with more that one variable (e.g., weather, target signatures, aircraft profile, threat scenario, etc.) and their effects on the MOE or response variable. Finally, we outline a method to deploy it throughout an organization. The attendee will be able to design simple factorial experiments with up to 4 variables, know what kinds of designs novices should avoid (Scenarios, One Factor At a Time, Taguchi, Plackett Burman, D-optimal), and know when to look for help. Interested students might include: Operations analysts, scientists, engineers, mathematicians, and technical supervisors responsible for projects involving experimentation, R&D, test and evaluation, qualification, or digital simulation. Prerequisites: current familiarity with applied statistics through the t-test is helpful but not required. Attendees will be supplied with course slides, reference papers, an annotated bibliography, Web links and a list of contacts for further information.

Hurry Up and Wait. . . Optimizing the Initial Skills Training Scheduling Process

AbstractID: 100

2nd. Lt Anthony A Illig, USAF
Air Force Institute of Technology
346 Evergreen Ave
Niceville,FL 32578
760-522-3275
anthony.illig@afotec.af.mil

Maj. August G Roesener, USAF
Air Force Institute of Technology
2950 Hobson Way, Building 643
Wright-Patterson AFB,OH 45433-7765
937-255-3636x4539
DSN: 755-3636x4539

Maj. Shane A Knighton, USAF
Air Force Institute of Technology
2950 Hobson Way, Building 643
Wright-Patterson AFB,OH 45433-7765
937-255-3636x4575
DSN: 755-3636x4575

FAX: 937-656-4943
August.Roesener@afit.edu

FAX: 937-656-4943
Shane.Knighton@afit.edu

Maj. Shane N Hall, USAF
Air Force Institute of Technology
2950 Hobson Way, Building 643
Wright-Patterson AFB,OH 45433-7765
937-255-3636x4624 DSN: 755-3636x4624
FAX: 937-656-4943
Shane.Hall@afit.edu

The United States Air Force commissions new officers as they complete their undergraduate degree or their officer commissioning training. These officers are commissioned frequently throughout the calendar year, sometimes in large groups. In order to adequately perform their job, they typically require completion of a series of initial skills training (IST) courses. We present a mathematical, repeatable and measurable method, based upon a minimum cost network flow model, for scheduling officers from six career fields (including Pilots, Navigators, Air Battle Managers, etc.) into their required IST courses.

Additional discussions include (1) obstacles and drawbacks to using a network flow model, (2) methods for overcoming these obstacles, and (3) algorithmic complexity. Results from several test cases will also be presented.

Patterns of Expenditure: When Should Peak Staffing Occur?

AbstractID: 165

Dr. William H Jarvis, OSD
OSD CAIG
1800 Defense Pentagon
Washington,DC 20301-1800
703-695-7282 DSN: 225-7282
FAX: 703-692-8054
will.jarvis@osd.mil

Putnam and Norden first proposed the Rayleigh curve model as a general pattern of staffing. The model is based on the argument that the rate at which progress should be made on a development effort is jointly proportional to the amount of task left and the amount of skill available to do the task. If we crudely assume that the amount of skill available increases linearly with time, then it follows that the rate of doing work (or staffing level) should be a Rayleigh curve. Later, Parr introduced the notion of a set of visible unsolved problems and provided a model based on the observation that the rate at which work can be usefully input to the development process is proportional only to our limited knowledge of the amount of work remaining. Empirically, both models have been shown to be a good fit to the time-history of expenditures for DoD programs. However, these models have practical problems with infinite tails and require the use of rules of thumb such as the “60/40 rule” to estimate the time of peak expenditure. The Sine model differs in detail from the Putnam-Norden and Parr models and yields an expenditure curve with well-defined starting and ending dates. The Sine model is well suited for estimating the point at which peak staffing should occur based on starting and ending dates commonly found in program acquisition baselines.

Markov Chain Analysis for a Pursuit / Evader Problem

AbstractID: 30

Dr. David Jeffcoat, USAF
AFRL/RWGN
101 West Eglin Boulevard, Ste 341
Eglin AFB,FL 32542
850-883-2693
david.jeffcoat@eglin.af.mil

Dr. Don Grundel, USAF
AAC/671 ARSS
102 West D. Avenue, Ste 12
Eglin AFB,FL 32542
850-882-9417
don.grundel@eglin.af.mil

This tutorial will provide an introduction to Markov chains. Markov chains have a rich and varied history in operations research but have been often overlooked as an important tool in the military operations research toolbox. As examples of important and timely applications, Markov chains are applied to problems such as war gaming, searching for moving time-critical targets, minesweeping, and force structure analysis. A particular application that is examined in this tutorial is a pursuit / evader problem in which the goal is to find a terrorist in a building. The tutorial consists of approximately equal parts lecture and hands-on exercise. Students will learn to model a pursuit / evader scenario by defining the state space and constructing a transition rate matrix. Students will derive steady-state probabilities for the evader’s location using basic linear algebra functions in Microsoft Office Excel. For time-critical scenarios in which an initial location of the evader is known, students will derive functions describing how the probability of the evader’s location evolves over time. Students are encouraged to bring a laptop computer with Excel.

Modeling IEDs in COMBATXXI

AbstractID: 384

Mr. Jeffrey O Johnson, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1401, Martin Luther King Avenue

White Sands Missile Range,NM 88002
575-678-2393
DSN: 258-2393
FAX: 575-678-8379
jeffrey.o.johnson@us.army.mil

Modeling of improvised explosive devices (IEDs) within a closed-form, entity-level combat simulation introduces multiple challenges at several levels. One such challenge is modeling, to a sufficient level of fidelity, the representation of the IED physical systems. Currently there is no agreed upon standard methodology for the representation of hit-to-kill IEDs within combat simulations. Additionally, modeling methodologies for fragmenting munitions in Army combat models are based upon munition delivery assumptions not representative of those involving IEDs. A collaborative effort is ongoing between TRAC-WSMR and other organizations to define these methodologies and data which support them to develop standards for IED representation in combat modeling. This presentation describes the methodologies, data requirements and COMBATXXI model enhancements required to effectively represent IEDs in the counter IED fight.

A Constraint Management Approach to Counter-IED Technology Deployment

AbstractID: 214

Mr. Leo H Jones
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311
703-578-2870
FAX: 703-578-2813
ljones@ida.org

As technology and procedures evolve to suppress or neutralize improvised explosive devices (IED), the threat adapts in turn. When faced with sophisticated countermeasures, the threat sometimes temporarily reverts to older, more reliable technologies. An analytical methodology is suggested that may enable military planners to anticipate such threat reactions, and adaptively deploy counter-IED resources so as to constrain the adversary's feasible or desirable options. Some surprising and counter-intuitive indications were obtained when this method was applied to a hypothetical trade-off between mine-resistant vehicles and more pervasive ISR deployment.

Mixed ISR Constellation Augmentation Strategy

AbstractID: 324

Maj. Dan Jones, USAF
AF/A9FX
1777 N Kent Street
Rosslyn,VA 22209
703-588-8662
Robert.Jones2@pentagon.af.mil

Mr. Todd Sterns
AF/A9FX
1777 N Kent Street
Rosslyn,VA 22209
703-588-8662
Todd.Sterns.ctr@pentagon.af.mil

Joint Force Commanders have access to a limited set of Intelligence, Surveillance, and Reconnaissance (ISR) collection platforms. In many cases, the constrained set of ISR resources is not capable of providing the required persistence to achieve the desired level of battlespace awareness in an area of operations. Additional commercial and military ISR collection systems, each with their own operational employment considerations and capabilities, may be available to augment the existing family of ISR platforms at the Joint Force Commander’s disposal.

Traditional ISR augmentation alternatives are created as independent sets of discrete capabilities to augment collection quantity. This effort describes a holistic ISR augmentation strategy where capabilities and platforms are able to augment each other across collection disciplines and domains. In this approach, we use linear programming techniques to design a mutually dependent superconstellation of air, space, or mixed set of ISR platforms to improve baseline ISR coverage in an area of interest.

Increasing Aircraft Carrier Forward Presence

AbstractID: 510

Mr. James G Kallimani
The RAND Corporation
1200 South Hayes St
Arlington,VA 22202
703-413-1100x5093
FAX: 703-413-8111
jamesk@rand.org

Mr. Roland J Yardley
The RAND Corporation
1200 South Hayes St
Arlington,VA 22202
703-413-1100x5578
yardley@rand.org

Mr. John F Schank
The RAND Corporation
1200 South Hayes St
Arlington,VA 22202
703-413-1100x5304
schank@rand.org

Dr. Clifford Grammich
The RAND Corporation
1776 Main Street
Santa Monica,CA 90407

310-393-0411x6776
grammich@rand.org

The U.S. Navy's aircraft carriers allow the nation to deter adversaries, bring airpower to bear against opponents, engage friends and allies, and provide humanitarian assistance. However, these powerful and versatile systems need continuous and regularly scheduled maintenance, and their crews require a great deal of training to attain and sustain readiness levels. The length of the carrier's training, readiness, deployment, and maintenance cycle, the type of maintenance needed, and the timing of events within the cycle affect the carrier's availability to meet operational needs. Over the past two decades, the proportion of time in a cycle that a carrier spends deployed has decreased, making it difficult for Navy planners to meet the forward presence requirements of theater commanders. In future years, as the number of carriers in the fleet fluctuates, this challenge will be compounded. In this study, RAND examines the technical feasibility of different cycle lengths and their effect on the forward presence of Nimitz-class aircraft carriers. The authors assess several one- and two deployment cycles, assuming a deployment length of six months and a time-between-deployments length equal to twice the duration of the previous deployment. The study also presents an analysis of the impact of different cycles on managing shipyard workloads. Among many findings, RAND concludes that shorter cycles can increase the forward presence of the carrier fleet and help level shipyard workloads. However, these shorter cycles will decrease fleet surge readiness. Longer, two-deployment cycles can increase forward presence, but may result in shipyard workload complications and deferred-work backlogs.

INTELLIGENCE SURVEILLANCE AND RECONNAISSANCE ASSET ASSIGNMENT FOR OPTIMAL MISSION EFFECTIVENESS

AbstractID: 342

Capt. Ryan D Kappedal, USAF
Air Force Institute of Technology
2950 Hobson Way
WPAFB,OH 45433-7765
505-366-1352
rkappedal@gmail.com

Maj. August G Roesener, USAF
Air Force Institute of Technology
2950 Hobson Way
WPAFB,OH 45433-7765
937-255-3636x4539
august.roesener@afit.edu

Maj. Shane N Hall, USAF
Air Force Institute of Technology
2950 Hobson Way
WPAFB,AK 45433-7765
937-255-3636
shane.hall@afit.edu

This research developed mathematical programming techniques to solve an intelligence, surveillance, and reconnaissance sensor assignment problem for USSTRATCOM. The problem as specified is shown to be extremely difficult (NP-Hard). With the smallest test cases, the true optimal solution is found using simple techniques, but, due to intractability, the optimal solutions for larger test cases are not found using these same techniques. Instead, heuristic techniques are applied to several test cases in order to find the best methodologies for finding true or near optimal solutions. Specifically, simulated annealing (SA) is tested for convergence properties across several different parameter settings. This research also utilizes local search techniques with simple exchange neighborhoods of various sizes. Mission prioritization is also examined via a weighted sum scalarization technique.

A Modeling and Simulation Approach to Analysis of Stressors on Non-Line of Sight Launch System (NLOS-LS) Control Cell Crew Performance

AbstractID: 236

Mr. Bret Kellihan
DCS Corporation / ARL HRED Contractor
1330 Braddock Place
Alexandria,VA 22304
571-227-6284 bkellihan@dcscorp.com

Evaluation of the warfighter’s workload while performing new operational tasks, with new equipment, is a difficult task. This paper describes a modeling and simulation based approach that is utilized to analyze the soldier’s task loading and workload in both nominal and stressed conditions likely to occur in the battlefield. In support of the Army Research Laboratory (ARL) Human Research and Engineering Directorate (HRED) and the Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC), the Modeling Architecture for Technology Research and Experimentation (MATREX) Human Centric Network Enabled Battle Command (HC-NEBC) Team is conducting an analysis of the effect of various stressors on the performance of Future Combat System (FCS) Spin Out 1, None Line of Sight – Launcher System (NLOS-LS) Control Cell (CC) operators. This paper describes the application of the HC-NEBC Command Control and Communications Human Performance Model (C3HPM) to analyze the NLOS-LS CC operator workload over time in varying stress conditions to derive an understanding of the performance envelope of the soldiers operating the CC. This effort is being utilized by TRAC to obtain an insight into the NLOS-LS operating characteristics prior to the Force Development Testing & Evaluation (FDT/E) event of the Future Combat Systems Spin Out 1.

Robust Metamodel Development for Complex Simulation Sensitivity Analysis and Validation

AbstractID: 195

Mr. Mitchell C Kerman
Stevens Institute of Technology
3 Bay Hill Court
Westampton,NJ 08060
609-518-8921
mckerman@comcast.net

The input-output relationships in complex systems are often difficult to characterize parametrically. Models and simulations are usually developed in order to explore and obtain an understanding of these relationships. Unfortunately, complex systems imply complex models and

simulations, and the execution of these models and simulations is often plagued by long runtimes, high costs, and excessive manpower. For these reasons and as a further complication to the analysis tasks, the number of computer runs may be limited. Certainly, all of the work performed in developing models and simulations of complex systems is wasted unless we can prove that these are valid representations of the real-world and have analytical merit.

Over the past two years, our research has concentrated on the problem of statistical validation of models and simulations of complex systems. This initial research led to more highly-focused work in the areas of simulation sensitivity analysis and uncertainty quantification. Our most recent research focuses on the development of robust “metamodels” to support the uncertainty quantification, sensitivity analysis, and validation of complex simulations. A metamodel is a parametric model of a simulation input-output relationship. Essentially, it is a model of a model (simulation) and two layers of abstraction from the real system. Advanced techniques, such as quantile regression and Gaussian process modeling, were studied and examined for their applicability in developing metamodels.

We have already demonstrated the efficacy of using a metamodel for the uncertainty quantification of the New York Harbor Observing and Prediction System (NYHOPS), a product of Stevens Institute of Technology’s Urban Ocean Observatory at the Center for Maritime Systems. NYHOPS monitors meteorological and oceanographic conditions both in real-time and forecasted out to 48 hours (i.e. provides oceanographic predictions) throughout the New York Harbor region. A sample use of metamodels for uncertainty quantification yielded a 66% reduction in the prediction uncertainty for surface temperature. Plans for our future work continue the use of metamodels to reduce the uncertainty of model predictions.

PEO Soldier Simulation Road Map V

AbstractID: 287

LTC Robert H Kewley, USA
USMA Department of Systems Engineering
4th Floor, Mahan Hall
West Point,NY 10996
845-938-5529
DSN: 688-5529
Robert.Kewley@usma.edu

PEO Soldier is faced with the challenge of executing over 400 specific programs in order to meet Army requirements for soldier systems. The complexity of this challenge requires them to take a systems engineering approach in order to develop alternative soldier architectures under program and budget constraints. A quick-turn modeling and simulation capability would enable better decision-making within this process. Previous work under this project shows that no single simulation provides the necessary capabilities for analysis of soldier systems. This year, under the direction of PEO Soldier, and management by USMA, model development teams from Infantry Warrior Simulation (IWARS) and OneSAF, developed a working high-level architecture (HLA) federation to support analysis of soldier weapons, sensors, and communications capabilities. This federation is supported by the software and tools developed within Research, Development and Engineering Command's (RDECOM) MATREX - Modeling Architecture for Technology Research and Experimentation - program. The integration is built around a capability to seamlessly model movement, direct fire, indirect fire, acquisition, and command and control messages. The development team used concepts from Model Driven Architectures (MDA) within the federation development process to communicate modeling requirements, assign functions to federates, and capture the necessary information flows between models. This approach yielded a functional federation that will be verified and validated within a pilot study in the upcoming year. Additional development will bring COMBAT XXI into the federation to better support analysis.

Modeling & Simulation Support to the Expeditionary Biological Detection Advanced Technology Demonstration

AbstractID: 162

Mr. Mike Kierzewski
US Army RDECOM Edgewood Chemical Biological Center
5183 BLACKHAWK RD, AMSRD-ECB-RT-IM E5951
APG-EA,MD 21010-5424
410-436-5408 FAX: 410-436-2165
michael.kierzewski@us.army.mil

Mr. Chris Gaughan
US Army RDECOM Edgewood Chemical Biological Center
5183 BLACKHAWK RD, AMSRD-ECB-RT-IM E5951
APG-EA,MD 21010-5424
410-436-5560 FAX: 410-436-2165
chris.gaughan@us.army.mil

Mr. Frank Wysocki
OptiMetrics, Inc.
100 Walter Ward Boulevard
Abingdon,MD 21009
410-569-6081
fwysocki@optimetrics.org

Mr. Jeff White
ITT AES
6767 Old Madison Pike, Suite 160
Huntsville,AL 35806-2178
256-964-1416 jeff.white@itt.com

The Expeditionary Biological Detection (EBD) Advanced Technology Demonstration (ATD) has three purposes:

1) Develop Marine Air-Ground Task Force (MAGTF) EBD Concepts of Employment for the use of man-portable, automated biological detectors and agent samplers.
2) Clarify and refine system capabilities for the Joint Biological Tactical Detection System (JBTDS) Concept Development Document (CDD).
3) Determine the military utility of current and next generation man-portable biological detectors and samplers.

In support of this ATD, Modeling & Simulation (M&S) has been used to quantify assessment issues, measures of effectiveness and concepts of employment. Specifically, the CB Simulation Suite and OneSAF were the main tools applied by the support effort conducted by the Edgewood Chemical Biological Center (ECBC) Modeling, Simulation and Analysis (MSA) Team. Moreover, various analytical techniques have been utilized that range from statistical methodologies to simple spreadsheet analyses.

This presentation will focus on the vignette (aka tactical situations) development process; the rational reduction process to manage the workload; the M&S development, setup and execution; and, the analysis process.

The CB Simulation Suite is a distributed simulation tool (Distributed Interactive Simulation (DIS), High Level Architecture (HLA) and Test and Training Enabling Architecture (TENA) compliant) created by the ECBC in coordination with ITT Corporation that includes a weapons of mass destruction (WMD) environment server (the Nuclear Chemical Biological Radiological (NCBR) Environment Server); simulations of the detector, sensor, and tactical messaging systems that the Services have developed to detect and operate in these environments (CB Dial-a-SensorTM, DAS); and a component capable of tracking the contamination status and exposure levels of entities involved in a distributed simulation exercise (CB Exposure Toxicity Server, ETS). It has been used in analyses and exercises supporting the Joint Program Executive Office for Chem-Bio Defense (JPEO-CBD), the Training & Doctrine Command (TRADOC) Maneuver Support Battle Lab (MSBL), and the Joint Forces Command (JFCOM).

Modeling Army Force Generation: Army Parallel Force Sufficiency Analysis for Operational Availability 2008

AbstractID: 141

Dr. Joshua Klimas, USA
Center for Army Analysis
6001 Goethals Rd
Ft Belvoir,VA 22060
703-806-5675
joshua.klimas@us.army.mil

The Army manages its force structure through the Army Force Generation process. The Center for Army Analysis (CAA) first developed the MARATHON simulation to analyze Army Force Generation for the 2005 Quadrennial Defense Review. MARATHON is now used for a wide range of analytical efforts concerning force sizing and management.

The Joint Staff's Operational Availability 2008 (OA-08) study included a Force Sufficiency Analysis that assessed the capacity of the Joint force to execute various multi-year demand timelines consistent with the Defense Strategy. CAA conducted a parallel analysis of the Army's capacity to execute the OA-08 demand cases using its MARATHON simulation. This presentation describes Army Force Generation, the modeling approach that we employ in MARATHON, and some results from our analysis.

Net Enabled Command and Control (NECC)

AbstractID: 403

Ms. Laura Knight, OSD
NECC, Defense Information Systems Agency
5275 Leesburg Pike
Falls Church,VA 22041
(703) 882 2268
laura.knight@disa.mil

CDR Paul Fink, USN
Defense Information Systems Agency
5275 Leesburg Pike
Falls Church,VA 22041
703-882-0329
FAX: 703-882-2829
paul.fink@disa.mil

Why should DoD invest in the Net Enabled Command Capability (NECC) now vice continuing to operate in a "business as usual" manner with the Global Command and Control System (GCCS) Family of Systems (FoS)? The answer lies within the operational benefits resulting from NECC and the functional benefits which result in a new business process for acquiring Command and Control (C2) capabilities for the DoD. NECC's single, Joint C2 architecture provides the Warfighter true horizontal and vertical integration across commands as well as business model improvements which lead to more effective employment of C2 capability. Functional improvements, including the Joint Combat Capability Developer (JCCD), Federated Development and Certification Environment (FDCE), and the implementation of a Service Oriented Architecture (SOA), provide for more rapid fielding than current processes and a more responsive, flexible, and adaptable system to support changing Warfighter needs. These benefits provide for business process engineering resulting in a new business model for C2 development and management and speeding delivery and fielding. By using new net-centric technology, the DoD shares capabilities world-wide, reducing costs through centralized support of C2 distributed in the field. The resulting standardized Joint C2 baseline of capabilities is necessary to achieve the Department's goals with C2 Capability Portfolio Management.

Stability Operations Gap Analysis

AbstractID: 359

MAJ Matthew D Koehler, USA
TRAC-Fort Leavenworth
255 Sedgwick Avenue
Fort Leavenworth,KS 66027
913-684-3329
matthew.koehler@us.army.mil

MAJ Jay Persons, USA
TRAC-Fort Leavenworth
255 Sedgwick Avenue
Fort Leavenworth,KS 66027
913-684-5752
jay.persons@us.army.mil

Mr. William J Krondak, USA
TRAC-Fort Leavenworth
255 Sedgwick Avenue
Fort Leavenworth,KS 66027
913-684-5426
william.krondak@us.army.mil

TRADOC Analysis Center (TRAC) teamed with the Center for Army Analysis (CAA) to conduct a strategic/theater level gap analysis project for the Army G-3 Stability Operations (SO) Office. The study's goal is to identify the Army capability gaps and their mitigation strategies in an SO

mission. The study uses Department of Defense Directive 3000.5, Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations and National Security Presidential Directive 44 as the baseline documents to define the Army's role in an SO mission. The study builds upon previous efforts conducted by TRAC and CAA at the operational level.

The study used the Department of State Post Conflict Reconstruction Task Matrix as the baseline task list for an SO mission. From this the team assembled a group of subject matter experts (SME) to identify Army strategic/theater tasks and developed missions, conditions and standards for the identified tasks. The team used the SME again to identify capability gaps and forces to execute the tasks. A capacity analysis was conducted by CAA using MARATHON and TRAC prioritized the capability gaps using survey techniques with a group of SME. Finally the team brought in representatives from across DOD to identify mitigation options and strategies.

The presentation will describe the process used by TRAC for its portion of the analysis, provide examples, and show results of the gap analysis project.

Testing the Improved Maverick Using Experimental Design

AbstractID: 230

Mr. Matthew Kowalski, USAF
28th Test and Evaluation Squadron, Eglin AFB, FL
203 West D. Avenue suite 507
Eglin AFB,FL 32542
850-882-1870
DSN: 872-1870
matthew.kowalski.ctr@eglin.af.mil

1st. Lt Aaron Drenth, USAF
28th Test and Evaluation Squadron, Eglin AFB, FL
203 West D. Avenue Suite 507
Eglin AFB,FL 32542
850-882-1833
DSN: 872-1833
aaron.drenth@eglin.af.mil

The war on terror has forced our military to reevaluate the tactics and weapons we use in modern warfare. Maximizing lethality and minimizing collateral damage are of the utmost concern for many of our Air Force's missions. The legacy Maverick missile system has proven to be a formidable solution to this dilemma; however no system is perfect and cannot be improved. Several software improvements have been made to the missile in an attempt to improve the Maverick's tracking accuracy and hence lethality. The AGM-65 Maverick is a guided, rocket-propelled air to ground missile developed for use against small hard targets such as tanks, armored vehicles, and surface-to-air missile sites which are either stationary or moving. Pilot or weapon systems officers center the displayed crosshairs on the desired target until the software initiates lock-on. After verification of lock-on the missile is launched and guides autonomously to the target. The guidance and control section software uses contrasts in black and white from the display to determine the boundaries of the target and to thus maintain lock during both pre and post launch. The improvements should help the missile maintain lock when encountering any scenario where the background contrast closely matches the target contrast or instances where the background clutter makes it difficult for the software to determine where the boundaries of the target are. A design of experiments (DOE) test matrix was constructed to analyze the testing envelope of both the captive carry and live fire releases on A-10 and F-16 aircraft. Using DOE maximizes the number of factors that could be evaluated while minimizing sample size required. DOE methodology also allows the test team to evaluate improvements while simultaneously verifying that there is no degradation from legacy performance.

Determining the Optimal Number of LCS Mission Packages

AbstractID: 527

CDR Keith D Kowalski, USN
Office of the Secretary of Defense - Program Analysis & Eval
1800 Defense Pentagon
Washington,DC 20301
703-697-0064
DSN: 312-227-0064
FAX: 703-692-6021
Keith.Kowalski@osd.mil

The Littoral Combat Ship (LCS) will satisfy the requirement to operate in the littoral and counter the growing threats of mines, diesel submarines and swarming small boats. It differs from previous multi-purpose combatants because its warfare capabilities will be staged off ship and "loaded" onboard prior to operations in the form of mission packages (MP). MPs include mine warfare (MIW), anti-submarine warfare (ASW), and anti-surface warfare (SUW). This study used simulation and optimization tools to analyze the tradeoffs between cost, performance, and demand for MP capabilities. The study's objective was to compare ASW, MIW, and SUW capabilities against the steady state security posture demand for those capabilities and determine if the Department's investment strategy is optimum.

Mission Package effectiveness was assessed through multiple tactical scenarios that were modeled in a variety of simulation environments. Using the tactical scenarios, measures of performance were obtained for the program of record (POR) MP composition and a wide set of alternatives. The POR was also used to determine the cost of MP components.

The demand for MPs capabilities in MCOs, LCOs, and forward presence was modeled using the Force Structure Analysis Tool (FORSAT). FORSAT is a stochastic simulation that models deployment cycles and response to crises of Naval Forces. The effectiveness of the POR and alternatives, cost data, and key response metrics from FORSAT were integrated into a spreadsheet optimization tool. The optimizer (LINGO) solves the following:
- The minimum cost MP composition for a given set of tactical and response parameters
- For a given cost profile, the optimal number of MP type and quantities.
- How to spend the next marginal dollar to increase LCS effectiveness.

Initial findings include:
- Based on the expected demand and threshold performance data, LCS effectiveness could be enhanced with a different MP procurement at

lower cost;
- Adding a helo improves MP performance across all three mission areas;
- Unmanned systems stress the ability of a minimally manned ship's ability to engage in long duration operations.

Emerging Worldwide Threats

AbstractID: 327

Maj. Taylor Krenkel, USAF	**Maj. Anh Hinshaw, USAF**	**Capt. Jennifer Geffre, USAF**
AF/A9FM	AF/A9FM	AF/A9FM
1777 N Kent Street	1777 N Kent Street	1777 N Kent Street
Arlington,VA 22209	Arlington,VA 22209	Arlington,VA 22209
703-588-8291	703-588-8695	703-588-0819
Taylor.Krenkel@pentagon.af.mil	Huynh.Hinshaw@pentagon.af.mil	Jennifer.Geffre@pentagon.af.mil

Analysis supporting current USAF force structure currently focuses on a limited number of potential adversaries. A robust understanding of future force requirements necessitates a rigorous and mathematically-based methodology to determine the current and emerging threats posed by potential adversaries worldwide. Current intelligence estimates demonstrate the proliferation of advanced technology across the globe. However, little current research incorporates the myriad complex, and often subjective factors, to determine the degree of threat posed by a particular actor. Through a novel value-focused thinking construct, a model was developed with the support of current intelligence and expert opinion. This flexible and dynamic model characterizes to what degree an adversary country can challenge US air dominance via land and air-based systems, both in current and future settings.

Applications of Adversary Modeling to Information Operations (IO) and Cyber Operations

AbstractID: 123

Mr. Michael Kretzer, USAF	**Dr. Janos Sztipanovits**	**Dr. Alexander H Levis**
Air Force Information Operations Center	Institute for Software Integrated Systems Vanderbilt Univers	George Mason University
102 Hall Blvd, Ste 311	VU Station B, Box 1829	261 Science and Technology Building II,
San Antonio,TX 78243	Nashville,TN 37235	Fairfax,VA 22030
210-977-2094	615-343-7572	703-993-1619
DSN: 969-2094	janos.sztipanovits@vanderbilt.edu	alevis@gmu.edu
FAX: 210-977-5474		
mike.kretzer@lackland.af.mil		

A long term shortfall in modeling/simulation efforts of IO/Cyber effects has been the impact on the human aspect related to the operator, crew interaction, and hierarchical organization. The talk will address a project called the C2 Wind Tunnel (C2WT) which provides an integration environment for various models and data sources. The C2WT allows for controlled and repetitive runs to look at integrated kinetic and non-kinetic effects in support of the operational and tactical levels. The current experiment is combining proven engineering level IADS and Communications models with an organization model (CAESAR III) that represents the decision making process in an Air Operations Center. This effort will allow for course of action development and evaluation that takes into account both the behavior and performance of the physical equipment and network as well as human processes in the execution of the observe, orient, decide, and act portions of the scenarios (the human piece). Two scenarios that show near term promise are tied to Counter- Integrated Air Defense (CIADS) and non-kinetic effects on time sensitive targets (TST). The brief will address the use of the wind tunnel in IO experimentation, exercises, risk reduction, tactics, techniques and procedures as well as course of action development tied to the CIADS and TST scenarios.

Common Component of Aircraft O&M Cost

AbstractID: 350

Mr. Michael Larkin, USAF
AF/A9RI
1777 N Kent Street
Arlington,VA 22209
703-588-6901
Michael.Larkin@pentagon.af.mil

This presentation is an extension of previously reported AF/A9R work on aircraft Operations and Maintenance (O&M) costs in which we concluded that historical context, as represented by time, has a significant correlation to O&M cost. After adjusting for inflation and changes in accounting practices and normalizing the data, we determined a linear relation for each aircraft's O&M costs over time. The residuals from this linear relationship have a similar pattern across the AF inventory. This "common component" of O&M costs reflects the more general fiscal, monetary and commodity environment. This presentation describes our increased understanding of the drivers of this common component cost; initial results show that the market price of oil combined with the rate of increase of civilian pay can be used to explain a significant portion of O&M cost variability over time.

Design of Experiments for Simulation Modeling

AbstractID: 26

Dr. Averill M Law
Averill M. Law & Associates
6601 East Grant Road, Suite 110
Tucson,AZ 85715
520-795-6265
FAX: 520-795-6302
averill@simulation.ws

Discrete-event and agent-based simulation models often have many input factors, and determining which ones have a significant impact on performance measures (responses) of interest can be a difficult task. The common approach of changing one factor at a time is statistically inefficient and, more importantly, is very often just incorrect, because for many models factors interact to impact on the responses. In this two-hour tutorial, we present an introduction to design of experiments (DOE), whose major goal in simulation modeling is to determine the important factors with the least amount of simulating. We discuss a simple and widely applicable approach to performing DOE in the context of simulation modeling, whereas methods based on classical statistics (i.e., ANOVA) make assumptions such as constant variances and normally distributed errors that are often not valid for simulation models.

How to Validate Your Models and Simulations

AbstractID: 27

Dr. Averill M Law
Averill M. Law & Associates
6601 East Grant Road
Tucson,AZ 85715
520-795-6265
FAX: 520-795-6302
averill@simulation.ws

In this two-hour tutorial we present techniques for building valid and credible simulation models. Ideas to be discussed include the importance of a definitive problem formulation, discussions with subject-matter experts, interacting with the decision-maker on a regular basis, development of a written assumptions document, structured walk-through of the assumptions document, use of sensitivity analysis to determine important model factors, and comparison of model and system performance measures for an existing system (if any). Each idea will be illustrated by one or more real-world examples. We will also discuss the difficulty in using formal statistical techniques (e.g., confidence intervals) to validate simulation models.

Economic Retention of Parts With Sporadic Demand

AbstractID: 467

Mr. Joel Lepak
LMI
2000 Corporate Ridge
McLean,VA 22102-7805
703-917-7017
FAX: 703-917-7477
jlepak@lmi.org

Dr. Tovey C Bachman
LMI
2000 Corporate Ridge
McLean,VA 22102-7805
703-917-7361
FAX: 703-917-7477
tbachman@lmi.org

Certain consumable repair parts are infrequently demanded by customers, but stocked because they are essential to maintaining weapon systems, and ultimately, to the war-fighter. For consumable parts with sporadic demand we developed the Peak ordering policy, which can reduce wholesale wait time 20 to 50 percent without increasing long-term inventory investment. We also showed that this wait time reduction leads to reduced retail backorders and fewer weapon systems down for lack of parts. DLA is implementing Peak Policy for select item populations. However, there is potential for the current retention policy to lead to disposal of stock purchased under Peak Policy. This could greatly reduce Peak Policy's benefits and increase procurement workload as disposed items are repurchased. We develop an alternative economic retention policy that is compatible with the Peak ordering policy and reduces these effects. We compare key customer service, financial and procurement workload metrics for the old and new retention policies using our Financial and Inventory Simulation Model (FINISIM). This study's results could be implemented for items using Peak Policy to avoid the undesirable interaction between retention and ordering policies for sporadic demand items.

Unmanned Systems Efforts at US Army Aviation & Missile Research, Development, & Engineering Center

AbstractID: 255

Mr. Larry J Levitt, USA
US Army Aviation & Missile Research, Development, & Engineer
5400 Fowler Rd, ATTN: AMSRD-AMR-AS-CC
Redstone Arsenal,AL 35898-5000
256-842-8771
DSN: 788-8771
FAX: 256-842-8764

larry.levitt@us.army.mil

The Aviation and Missile Research, Development, and Engineering Center (AMRDEC) has played a pivotal role in both air and ground unmanned systems for many years. This briefing will provide an overview of current efforts focused on weaponization, control, simulation, and teaming of unmanned systems. Technology base efforts, early concept evaluation studies, Small Business Innovation Research (SBIR) programs, and Congressional programs will be included. Concepts for precision lethality in an urban environment will be presented. Analytical techniques to infer collision avoidance parameters for small unmanned aircraft systems will be presented based on feasibility studies involving ultra wideband radar and laser radar.

Collision Avoidance Sensor Trade Study (CASTS)

AbstractID: 128

Mr. Chris R Linhardt	**Mr. Richard Graeff**	**Mr. Paul R Sheridan**
General Dynamics Advanced Information Systems 2210 8th St., Room 113 Wright-Patterson AFB,OH 45433 937-255-8629 DSN: 785-8629 FAX: 937-476-2900 chris.linhardt@wpafb.af.mil	ASC/XRA 2210 8th St., Suite 1 Wright-Patterson AFB,OH 45433 937-255-5880 DSN: 785-5880 FAX: 937-904-7208 richard.graeff@wpafb.af.mil	CACI – FEDERAL, Inc. 8527 Egret Meadow Ln. West Palm Beach,FL 33412 561-625-5498 psheridan@caci.com

Unmanned Aircraft System (UAS) platforms need routine access to the National Airspace System (NAS), but such access is currently limited in part due to an inability to reliably detect and avoid other air traffic. Current measures for flying UAS in the NAS are cumbersome and time consuming.. One of the proposed material solutions to resolve this problem for UAS is to equip the UAS with autonomous collision avoidance systems. There are three major components of collision avoidance systems: a sensing subsystem or subsystems, the collision avoidance algorithm, and the UAS air vehicle.

The primary objectives of CASTS are to:
• Analyze the sensor attribute and performance trade space to assess the impact on reliable collision avoidance.
• Provide insight into the effects of sensor attributes and performance sufficient to assist in the formulation of Key Performance Parameters (KPPs).
The problem statements for this analysis are:
• What would the required attributes and performance of the sensor package be for the UAS to minimize occurrence of Near Mid-Air Collisions (NMAC)?
• In particular, the analysis focuses on the following sensor attributes and performance:
o UAS maneuverability and target aircraft closure rates
o Sensor FOV and range performance
o Azimuth and elevation angle errors
o Range detection error
o Range rate error
o Update rate
o Track Manager characteristics

The primary use case the analysis addresses is the transition from take-off to IFR airspace.
Key metrics for the analysis are: NMAC rate, point of closest approach, time to achieve Instrument Flight Rule (IFR) airspace, total detections, range at first detection, detection location error, tracks established, range at track establishment, tracks dropped, track location error, avoidance maneuvers initiated, and unnecessary avoidance maneuvers initiated.

Geo-Based Optical Space Surveillance (G-BOSS) Concept MUA Design of Experiments, Analysis, and Results

AbstractID: 150

Ms. Lynda K Liptak	**Ms. Monica L Montoya, USAF**	**Mr. Gary Fauss**
Applied Research Associates, Inc. 4300 San Mateo Blvd, NE Suite A-220 Albuquerque,NM 87110 505-883-3636 DSN: 853-4120 FAX: 505-872-0794 lliptak@ara.com	AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFB,NM 87117 505-853-6196 DSN: 263-6196 monica.montoya@kirtland.af.mil	ATK 5011 Indian School, Suite 500 Albuquerque,NM 87110 505-853-6078 DSN: 263-6078 gary.fauss@kirtland.af.mil
1st. Lt Judson McCarty, USAF	**Mr. Brian Spanbauer**	**Mr. Taylor Mitchell**
AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFR,NM 87117 505-846-2653 DSN: 246-2653 judson.mccarty@kirtland.af.mil	ATK 5011 Indian School, Suite 500 Albuquerque,NM 87110 505-853-6078 DSN: 263-6078 brian.spanbauer@kirtland.af.mil	Sparta, Inc. 2401 E. El Segundo Blvd, Suite 100 El Segundo,CA 90245 310-727-0950x109 taylor.mitchell@sparta.com

Among the many challenges in conducting a modeling and simulation-based Military Utility Assessment (MUA) with a complex trade space is

the organization, analysis and understanding of massive amounts of data output. In order to comprehend the effects and interaction of effects upon the desired outcomes, we used the 2n factorial design of experiment (DOE) approach for the AFRL/RVES Geo-Based Optical Space Surveillance (G-BOSS) Concept MUA. We examined the cause and effect relationship of various G-BOSS configurations and respective mission performance. The configurations were defined by high and low settings for four performance factors: sensor resolution, sample rate, data storage capacity and downlink rate. We also examined constellation sizes of 4, 8, and 24 satellites, and two operational vignettes defined by different expected frequencies of imaging events. The responses examined in the DOE included timeliness, accuracy, and coverage measures of effectiveness. Data for the experiments were obtained using the System Effectiveness Analysis Simulation (SEAS) results and supporting Excel macros. The analysis and interpretation of the simulation output included using Design-Ease DOE software. This briefing will discuss the structure of the DOE, challenges of execution, methodology for data capture and analysis, and will present study results to date.

Ithaca: An Unclassified Scenario Suitable for International Use

AbstractID: 437

Mr. Daniel Loibl
NAVAIR
1900 N. Knox Road STOP 6207
China Lake,CA 93555-6106
760-939-8149
DSN: 437-8149
FAX: 760-939-2232
daniel.loibl@navy.mil

In the course of participation in multiple joint US-UK analysis studies, it became apparent that a scenario, preferably unclassified, was needed to provide a common frame of reference. With that goal in mind, Ithaca was developed utilizing the Pacifica scenario developed by the USWESTCOM Joint Intelligence Center at Hurlburt Field, Florida as a starting point. Ithaca continues to grow in order to support evolving analysis objectives, but as it currently exists, it is sufficiently robust for use in joint US-UK wargames, and studies at mission and campaign levels. Current studies are focused on time-sensitive targets and unmanned combat aerial systems. The Ithaca scenario includes geography, socio-political background, a limited order of battle (adequate to support applicable studies thus far), and targets, including numbers and types, coordinates for static and some relocatable targets, and, in some cases, tactics.

Prognostics and Health Management (PHM) capability in the Logistics Composite Model (LCOM)

AbstractID: 154

Mr. Joel Luna
Dynamics Research Corporation
10 Carter Drive
Chelmsford,MA 01824
978-256-5451
jluna@drc.com

Aeronautical System Command's Logistics Composite Model (ASC LCOM) is a legacy discrete-event simulation model of logistics support of military aircraft. ASC LCOM is used to determine key predicted performance measures such as sortie generation rate (SGR) based on detailed support resource information. One form of the resource data is the reliability data, represented as times between failures or maintenance actions, which are typically generated stochastically. The time to failure, while known to the inner workings of the simulation, is not known (nor should be known) to the user. This presentation introduces new features which provide for the specification of a predicted failure time based probabilistically on the actual failure time, and allow the user to specify actions to be taken based on the predicted failure time (such as ordering replacement parts in advance). The new features together comprise a Prognostics and Health Management (PHM) modeling capability in LCOM. Implementation details, related issues, potential uses, and an example are also provided.

Considering the use of percentiles and confidence when finding resource levels which meet performance requirements

AbstractID: 155

Mr. Joel Luna
Dynamics Research Corporation
10 Carter Drive
Chelmsford,MA 01824
978-256-5451
jluna@drc.com

Performance requirements for military systems are often evaluated using modeling and simulation, particularly in cases where the system does not yet exist (such as in acquisition) or is too expensive or time-consuming to conduct actual experiments. When simulations of military systems are used which are stochastic and require statistical processing of output, then a selected test statistic is compared to the performance requirement to determine if the requirement is met or not. More often than not, the statistic chosen is a mean, sometimes with a confidence interval, such as mean sortie generation rate (SGR) with fighter aircraft. When system requirements are being determined, such as logistical support requirements for fighter aircraft, different levels of support resources (such as manpower, equipment, and parts) which produce different values for the mean SGR are evaluated. The minimum levels of support resources which yield a mean SGR which still meets the performance requirement are selected as the 'best' levels. This presentation proposes that the lower confidence bound of the mean, and not the mean itself, should be used to compare with the performance requirement. Mainly, the paper considers whether the use of the lower confidence bound of one or more selected percentiles would better capture the performance requirement. The pros and cons of using percentiles versus the mean are presented with examples.

Tutorial and Overview of Agent-based Modeling and Simulation and Complex Adaptive Systems

AbstractID: 86

Dr. Charles M Macal
Argonne National Laboratory
9700 S. Cass Ave., Bldg 900-DIS
Argonne,IL 60439
630-252-3767
macal@anl.gov

Dr. Michael J North
Argonne National Laboratory
9700 S. Cass Ave., Bldg 900-DIS
Argonne,IL 60439
630-252-6234
north@anl.gov

Agent-based modeling and simulation (ABMS) is a novel approach to modeling systems comprised of interacting autonomous agents based on the complex adaptive systems (CAS) paradigm. ABMS is an attractive technique because it lends itself to modeling the dynamics of social interaction and social processes. ABMS is finding widespread application in many areas from the modeling of supply chains and logistics systems, to predicting the spread of epidemics and the diffusion of public information, from identifying factors in the fall of ancient civilizations to understanding contemporary urban conflict, from modeling consumer purchasing behavior to flexible manufacturing operations, to name a few. Defense related areas of ABMS applications include net-centric warfare, combat, command and control, logistics, DIMES-PMESII, and others. Computational advances have made possible a growing number of agent-based applications in a variety of fields at ever-increasing scales. This full-day, hands-on tutorial and overview presents the foundations of CAS and ABMS, approaches for developing agent models from spreadsheets to agent software toolkits, the relationship between ABMS and traditional modeling techniques, and the special challenges for ABMS pertaining to the need for agent data, theories of agent behavior, and validation requirements. The tutorial will be hands-on using Excel spreadsheets and the Repast agent-based modeling toolkit.

CENTCOM Theater Express -- Next

AbstractID: 461

Lt. Col. Jean M Mahan, USAF
USCENTCOM CDDOC
709 Ward Drive
Scott AFB,IL 62269
965-389-5707
DSN: 318-430-5707
jean.m.mahan@kuwait.swa.army.mil

CENTCOM Deployment Distribution Operations Center(DDOC) has been asked to lead a Business Case Analysis to develop and evaluate a number of COAs to take the current theater express program to the next level as we mature the theater and look to stabilize the longterm commercial solution for the theater. We are examining a number of key performance parameters as they may relate to an RFP solicitation to include performance, cost, ITV, multi-modal expandable, cargo handling "no-touch" operations, and stewardship to the American taxpayer. As we are developing COAs, we are also examining hybrid systems that can produce regular business for winning carriers and reward both performance and nation-building equities. This presentation will summarize this efforts.

Robust Sensitivity Analysis of Courses of Action Using an Additive Value Model

AbstractID: 387

Mr. Hunter A Marks, USAF
AFIT/ENS
2950 Hobson Way
Wright-Patterson AFB,OH 45344
937-255-3636x6004
hunter.marks@us.af.mil

The Department of Defense (DoD) requires the ability to quantifiably measure progress in arenas that are dynamic, complex, and difficult to measure, such as the stability of a region. Therefore, the DoD works diligently to predict the effect of operations and sponsors research to improve prediction and analysis. They desire a repeatable, systematic methodology to aid in the selection of courses of action (COA) that efficiently meet stated objectives and quantitatively measure the degree of accomplishment of these objectives. The author proposes a value-focused thinking (VFT) decision analysis (DA) approach to this problem. This methodology not only aids in selection of possible COAs, but provides a framework to compare the effectiveness of implemented actions via key indicators. Due to the complex, dynamic nature of COA selection and assessment, weights within the DA model are often fluid. Sensitivity analysis provides the justification of COA selection in such an environment. This thesis focuses on conducting further analysis of the ranked alternatives through a robust sensitivity analysis technique.

Sensitivity analysis begins with the examination of the top ranked alternative by varying one weight at a time, one-way sensitivity. The author then proposes a more robust examination of multiple weight sensitivity using five unique metrics and optimization via linear and non-linear programming. The metrics reveal the alternatives sensitive to small simultaneous variations of multiple weights within the model, n-way sensitivity. Small metric values indicate sensitive alternatives, and indicate to a field commander where to more closely examine the consequences of a selected COA.

USMC Irregular Warfare (IW) Study – Colombia Scenario

AbstractID: 103

LT Robin Marling, USN
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6019
FAX: 703-784-3547
robin.marling@usmc.mil

Mr. Richard Clinger, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8192
FAX: 703-784-3547
richard.clinger@usmc.mil

Ms. Patricia Rossmaier, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6011
FAX: 703-784-3547
patricia.rossmaier@usmc.mil

Mr. Cortez (Steve) Stephens, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6029
FAX: 703-784-3547
cortez.stephens@usmc.mil

Dr. Bob Sheldon
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8320
FAX: 703-784-3547
robert.sheldon.ctr@usmc.mil

The Marine Corps Combat Development Command (MCCDC) Operations Analysis Division (OAD) IW study team selected a humanitarian assistance/disaster relief (HA/DR) operation in the Buenaventura region of Colombia as a scenario to exercise their IW study methodology. The primary model used is the agent-based simulation Pythagoras. To effectively model IW, Pythagoras needs to be tied to the reality of an insurgency and counterinsurgency through information, theory, and expertise. We developed appropriate IW input parameters for Pythagoras using Colombia subject matter experts (SMEs). The emphasis of our briefing will be on using real-world data and exercising IW concepts in Pythagoras.

Using an Irregular Warfare (IW) Wargame to Frame a Pythagoras Scenario and Issues

AbstractID: 105

LT Robin Marling, USN
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6019
FAX: 703-784-3547
robin.marling@usmc.mil

Mr. Richard Clinger, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8192
FAX: 703-784-3547
richard.clinger@usmc.mil

Ms. Patricia Rossmaier, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6011
FAX: 703-784-3547
patricia.rossmaier@usmc.mil

Dr. Bob Sheldon
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8320
FAX: 703-784-3547
robert.sheldon.ctr@usmc.mil

Mr. Edmund J Bitinas
Northrop Grumman Mission Systems
12900 Federal Systems Park Drive Suite 4134
Fairfax,VA 22033
703-968-1196
FAX: 703-968-1294
edmund.bitinas@ngc.com

The Marine Corps Combat Development Command (MCCDC) Operations Analysis Division (OAD) IW study team selected the agent-based simulation Pythagoras as its primary modeling tool. To help frame the Pythagoras scenario, we conducted a Colombia wargame. The wargame highlighted areas of interest and critical decisions made that were later incorporated into a Pythagoras scenario for detailed analysis. The emphasis of our briefing will be on capturing the essence of an IW wargame, translating the concepts from the wargame into Pythagoras inputs, and exploring the added value this technique offers.

Developing Irregular Warfare (IW) Human Terrain Data Input for an Agent-based Model

AbstractID: 107

LT Robin Marling, USN
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6019
FAX: 703-784-3547
robin.marling@usmc.mil

Mr. Richard Clinger, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8192
FAX: 703-784-3547
richard.clinger@usmc.mil

Ms. Patricia Rossmaier, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6011
FAX: 703-784-3547
patricia.rossmaier@usmc.mil

Dr. Bob Sheldon
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8320
FAX: 703-784-3547
robert.sheldon.ctr@usmc.mil

Mr. Cortez (Steve) Stephens, USMC
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6029
FAX: 703-784-3547
cortez.stephens@usmc.mil

The Marine Corps Combat Development Command (MCCDC) Operations Analysis Division (OAD) IW study team selected a humanitarian assistance/disaster relief (HA/DR) operation in the Buenaventura region of Colombia as a scenario to exercise their IW study methodology. The primary model used is the agent-based simulation Pythagoras. Pythagoras incorporates soft decision rules and triggers to allow agents to

change their behavior as a function of events or actions. To effectively model IW, Pythagoras needs to be tied to the reality of an insurgency and counterinsurgency through information, theory, and expertise. We used a narrative approach to translate cultural concepts from the IW environments, interviewed Colombia subject matter experts (SMEs), and developed appropriate input parameters for Pythagoras. The emphasis of our briefing will be on developing the IW narratives and showing how they translate to Pythagoras inputs.

Demonstration of Irregular Warfare (IW) Pythagoras Modeling Suite

AbstractID: 111

LT Robin Marling, USN
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-784-6019
FAX: 703-784-3547
robin.marling@usmc.mil

Mr. Steve Upton, USN
Naval Postgraduate School
1 University Circle
Monterey,CA 93943
352-684-1353
FAX: 352-684-xxxx
scupton@nps.edu

Mr. Edmund J Bitinas
Northrop Grumman Mission Systems
12900 Federal Systems Park Drive Suite 4134
Fairfax,VA 22033
703-968-1196
FAX: 703-968-1294
edmund.bitinas@ngc.com

Dr. Bob Sheldon
MCCDC OAD
3300 Russell Road
Quantico,VA 22134
703-432-8320
FAX: 703-784-3547
robert.sheldon.ctr@usmc.mil

This demonstration will include the latest version of Pythagoras and its supporting tool suite, i.e., Pythagoras 2.0, the Rapid Scenario Generation (RSG) tool, and the Design of Experiments (DOE) tool.

Pythagoras is an agent-based modeling environment, providing the user with a host of optional capabilities, rules and behaviors to describe an agent. The new capabilities that it introduces include soft decision rules, dynamic sidedness, behavior-change triggers, non-lethal weapons, and variable attributes. Variable attributes, new to version 2.0.0, can be used to trigger new behaviors, and can be changed by weapons, communications, events or the terrain itself.

The RSG tool reduces the time required to develop an executable scenario file through the reuse of developed and approved simulation objects. The intent of this effort is to develop a generic front-end scenario development tool that might be used with any number of simulation models.

The DOE tool reduces the development and execution time for computational experiments that involve large numbers of factors by providing a generic front end interface to guide the analyst through the construction of an experimental design and facilitate that design execution in a high performance computing (HPC) environment.

Adaptive Planning – Linkages with the Analysis Community

AbstractID: 233

COL Paul Martin, USA
OUSD(P)/Policy Planning
2000 Defense Pentagon Room 3A1066
Washington,DC 20301
703-697-1489
paul.martin@osd.mil

Col. Julian H Tolbert, USAF
JCS/J7/JOWPD
2000 Joint Staff Pentagon
Washington,DC 20301
703-614-5217
julian.tolbert@js.pentagon.mil

Lt. Col. Michael "Kent" Taylor, USAF
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington,VA 22202
703-699-1703
DSN: 499-1703
FAX: 703-601-0357
michael.taylor@osd.mil

Mr. Randy Wimmer, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington,VA 22202
703-699-1705
DSN: 499-1705
FAX: 703-601-0357
randy.wimmer.ctr@osd.mil

This briefing is an overview of the DOD Adaptive Planning (AP) initiative. The purpose of the AP initiative is to develop and field a collaborative planning and execution system that will provide Combatant Commanders, Joint Force Commanders, Service/Functional Commanders, Combat Support Agencies and the Joint Staff with an end-to-end process and technology system that supports all aspects of DoD planning and execution, to include assessments of proposed Courses of Action (e.g., transporation feasibility). The briefing covers the three stages of the AP initiative: Initiation, Implementation (current stage), and Integration.

In addition to providing an overview of the AP Initiative, the briefing will highlight recent efforts to leverage AP-related tools and technologies by the Analysis Community for strategic analyses. Whereas AP-related tools and technologies are focused on “real world” planning and current forces, OSD/PA&E Joint Data Support is leading a collaborative effort to assess the feasibility of combining “real world” AP software with outyear data to support the development of DoD Analytic Agenda products (e.g., development of future Concepts of Operations and force lists to be utilized in analyses supporting DoD planning, programming, and acquisition).

Attribution Concepts for Sub-meter Resolution Ground Physics Models

AbstractID: 564

Mr. George L Mason, USA U. S. Army ERDC 3909 Halls Ferry Road Vicksburg,MS 39183 601-634-2274 FAX: 601-634-3068 Masong@wes.army.mil	**Mr. Christopher L Cummins, USA** U. S. Army ERDC 3909 Halls Ferry Road Vicksburg,MS 39180-6199 601-634-3839 FAX: 601-634-3068 christoper.l.cummins@erdc.usace.army.mil	**Mr. Buhrman Q Gates, USA** U. S. Army ERDC 3909 Halls Ferry Road Vicksburg,MS 39180-6199 601-644-3200 FAX: 601-634-3068 Burhman.Q.Gates@erdc.army.mil
Mr. Jody D Priddy ERDC, Vicksburg,MS 39180 601-634-3015, jody.d.priddy@usace.army.mil		

Research aimed at developing High Performance Computing (HPC) simulation testbeds to address various high-priority military applications is currently being pursued by the US Army Engineer Research and Development Center (ERDC). One example HPC application relates to Autonomous Navigation System (ANS) performance for Unmanned Ground Vehicles (UGV) and more specifically to limitations in the current state-of-the-art for sensor perception during UGV maneuvers in outdoor tactical environments. ERDC is addressing the UGV ANS application by developing a Virtual Autonomous Navigation Environment (VANE) simulation testbed which will involve a suite of integrated, high-resolution, physics-based models for environment, terrain, vehicles, and sensors. The models that will be used in VANE and other ERDC simulation testbeds will require relevant and representative physical attributions that are consistent with highly complex and heterogeneous terrain environments. This presentation describes geostatistics and attribute correlation concepts for representing spatial variation in soil attributions required for high-resolution three-dimensional ground physics models using an example case involving sub-meter sampling from the ground surface and sub-surface.

Few-Sweeper Models of Naval Minesweeping with Casualty Replacement Gaps

AbstractID: 238

Mr. Michael L McCurdy
HQ U.S. Pacific Command (J84)
Box 64028
Camp H.M. Smith,HI 96861-4028
808-477-7862
DSN: 315-477-7862
FAX: 808-477-7879
mike.mccurdy@pacom.mil

A previous presentation to MORSS (2007) described the “few-sweeper” models of naval minesweeping. These models relax one of the major assumptions underlying the so-called many-sweeper model, namely that the number of sweepers available to replace sweeper casualties is infinite. However, the few-sweeper models retain a second major assumption of the many-sweeper model, that sweeper casualties are replaced seamlessly in space and time.

This presentation describes recent progress in developing few-sweeper models that relax the seamless replacement assumption. These “few-sweeper models with replacement gaps” assume that a sweeper casualty is replaced at the beginning of the run following the one on which the casualty occurred. The resulting model formulation requires solution of first-order non-homogeneous differential equations. Other adjustments to the few-sweeper models are needed to ensure that multiple sweeper casualties cannot occur on a single run. The one-sweeper model, a limiting case of the few-sweeper models in which the issue of replacement does not arise, plays a key role in formulating few-sweeper models with replacement gaps.

In addition to being of interest as minesweeping models, the few-sweeper models with replacement gaps are also of interest as minefield transit models. By regarding each ship in a task group as a sweeper that makes a single run through a minefield, the few-sweeper models with replacement gaps provide an analytic approach to estimating minefield effectiveness against a task group transit.

Calibrating Hits-per-Kill in ITEM: It's Harder Than It Looks

AbstractID: 262

Mr. Michael L McCurdy
HQ U.S. Pacific Command (J84)
Box 64028
Camp H.M. Smith,HI 96861-4028
808-477-7862
DSN: 315-477-7862
FAX: 808-477-7879

mike.mccurdy@pacom.mil

The Integrated Theater Engagement Model (ITEM) is an expected-value joint and combined campaign model at the operational/strategic level of war. ITEM uses a two-part algorithm for calculating a ship's probability of surviving a specified number of weapon hits. One part, known as the “power form,” applies when the expected number of hits in an engagement exceeds 1. The second or “linear” form applies when the expected number of hits is less than 1. Calibration of ITEM to accepted sources of hits-per-kill data, such as the Joint Munitions Effectiveness Manual, is usually done on the basis of the power form. This presentation shows that, when a large number of engagements entail fractional hits, a calibration done on the basis of the power form is not reproduced during ITEM runs. Specifically, a ship’s cumulative probability of survival tends to be higher than calibrated for the expected number of hits. This implies that more hits, and hence more weapons, are needed to lower a ship’s cumulative probability of survival below ITEM’s “defeat threshold.” The presentation recommends an alternative form of calibration for weapon-ship pairs where expected numbers of hits are fractional, and recommends a specific value of the defeat threshold that improves the accuracy with which ITEM calculates cumulative probability of survival for these pairs.

MATREX Providing Tools to Build Interoperable Network Centric M&S Environments

AbstractID: 36

Ms. Lana E McGlynn
RDECOM/MCG
1805 Crystal Drive Suite 406
Arlington ,VA 22202
703-980-8546
lana.mcglynn@gmail.com

Mr. Tom Hurt, USA
US Army Research, Development, Command
SOSI
Ft. Belvoir, ,VA 22060
703-806-0995
tom.hurt@us.army.mil

Mr. Joe McDonnell
Dynamic Animation Systems, Inc.
12015 Lee Jackson Highway Suite 200
Fairfax,VA 22033
703-428-6869
joe.mcdonnell@us.army.mil

The Modeling Architecture for Technology, Research, and EXperimentation (MATREX) Program is a key distributed modeling and simulation environment in the US Army. MATREX provides a unifying M&S architecture, supporting tools, and infrastructure to ease the integration and use of multi-resolution multi-fidelity live, virtual, and constructive (LVC) applications. One of the goals of DoD Modeling and Simulation (M&S) is to reduce the time and costs associated with experimentation and analysis. The MATREX program accomplishes this by providing an environment and a set of tools to support Systems of Systems design and development from requirements through test and integration. This environment is adaptable to the needs of the user, so that only those components necessary or desired are actually utilized.

We will present the MATREX program overview and objectives, then describe the current state of the architecture, tools, and services. Discussion will focus on how the MATREX program provides a common interface and enforces design decisions in a well-documented environment that can assist in solving issues encountered in using M&S for experimentation and analysis. We will specifically provide examples of how MATREX addresses M&S Event Management by employing a foundation for Army M&S events through functional system design, software integration and test tools, simulation middleware, and event execution services.

Additionally we will provide examples of MATREX Demonstrations and Analytical Support to Network Effects Command and Control (NEC2) in AMRDEC JAMUS and NEC2, and an example highlighting Communications Effects.

Implementing Sustainment Battle Command (SBC) in the Advanced Warfighting Simulation (AWARS)

AbstractID: 349

Ms. Bonnie J McIlrath, USA
US Army TRADOC Analysis Center
255 Sedgwick Avenue
Ft. Leavenworth,KS 66027-2345
913-684-7566
DSN: 552
FAX: 913-684-7589
Bonnie.j.Mcilrath@us.army.mil

In stark contrast to the current methods of having logistics planning and execution react to the maneuver commander's plan, future sustainment planning and decision making will become an integral element of the maneuver commander's planning cycle. The concept for sustainment is to ensure synchronization of logistics planning with the higher commander’s decision cycle, ensure unity of command in support of the commander’s priority and intent, and enable synchronization of logistics capabilities in support of the commander at both the operational and tactical levels. Sustainment battle command (SBC) is a key factor in ensuring effective and efficient sustainment. SBC is defined as the application of leadership and decision making to the planning and execution of sustainment operations in support of combat. Internalizing the definition of SBC is not that difficult; translating SBC to actors, actions and rules sets for a simulation is complex.

The Training and Doctrine Command (TRADOC) Analysis Center (TRAC) has put into operation its newest corps/division level simulation called the Advanced Warfighting Simulation (AWARS) which replaces Vector-In-Commander (VIC) as the Army standard. TRAC uses AWARS in support of operational analyses of concepts, doctrine, organizations, and combat systems. As part of AWARS’ continued development, the Army G-3 is sponsoring a project which in FY08 to implement SBC in AWARS.

Implementation of SBC in AWARS is being conducted in three phases: conducting research of doctrine and tactics, techniques and procedures (TTP); engaging subject matter experts (SMEs) in a workshop to validate the sustainment decisions, network and enablers that could be used in simulation; and implementation and testing in AWARS. SBC research for implementation includes sustainment command

and control of hybrid forces at echelons above brigade (EAB), effects of maneuver on logistics, and SBC decisions, network, and enablers. This effort will result in improved analysis of SBC relating to resupply, distribution, and the maneuver plan at EAB. This presentation covers the findings of the SBC research, issues associated with SBC, the implementation methodology.

Operationalizing Unmanned Aerial System (UAS) for Modeling and Simulation and Analysis

AbstractID: 358

LTC Kaye McKinzie, USA
TRADOC Analysis Center, Fort Leavenworth
Funston Hall, Bld 286; 255 Sedgwick Ave
Fort Leavenworth,KS 66027
913-684-9131
DSN: 552
FAX: 913-684-9151
kaye.mckinzie@us.army.mil

Ms. Kelaine Nick, USA
TRADOC Analysis Center, White Sands Missile Range
ATTN: (ATRC-WSN)
White Sands Missile Range,NM 88002-5502
575-678-5966
kelaine.nick@us.army.mil

MAJ Laura Byrd, USA
TRADOC Analysis Center, Fort Leavenworth
Funston Hall, Bld 286; 255 Sedgwick Ave
Fort Leavenworth,KS 66027
913-684-6469
DSN: 552
laura.byrd@us.army.mil

Mr. Benjamin A Anderson, USA
TRADOC Analysis Center, Fort Leavenworth
Funston Hall, Bld 286; 255 Sedgwick Ave
Fort Leavenworth,KS 66027
913-684-7568
DSN: 552
ben.a.anderson@us.army.mil

The roles and contributions of Unmanned Aerial Vehicles (UAS) on the battlefield are rapidly changing. From being primarily an intelligence asset in the past, UAS are becoming integrated, organic, force-multipliers to units at all echelons, supporting Reconnaissance, Surveillance, and Target Acquisition (RSTA). As UAS roles expand, their contributions to not just intelligence gathering, but combat actions are also increasing. In June 2007, on the heels of the successful Army UAS Mix Analysis (AUMA) the TRADOC Analysis Center initiated the TRAC UAS Functional Representation (TUFR) project. This concentrated effort focused on ensuring that the Army's representation of UAS in tactical and operational models and simulations is appropriate both for how they are operationally employed today and how they will be employed in the future. This presentation presents two distinct aspects of this study, the operational performance data and the processes of mission planning, execution and recovery and information flow.

This project began with the UAS performance characteristics and categories defined in the AUMA. New operationally driven UAS performance categories and operational performance values were developed through a series of interviews with subject matter experts (SMEs) representing the UAS proponents and program managers, UAS school house instructors, and UAS users and operators in both the continental United states (CONUS) and outside (OCONUS) in training and combat environments. Results were screened by a similar group of SMEs as well as throughout TRADOC school houses and battle labs. The final data set was reviewed and approved by G-3/5/7 Aviation, Army Program Managers and TRADOC stakeholders.

To adequately represent current UAS behaviors in combat models, modelers need to consider not just the performance characteristics of UAS and their payloads, but also the operational characteristics associated with the mission planning, launch and recovery, and mission execution of those UAS. This presentation describes Army UAS employment characteristics of mission planning, launch and recovery operations, and mission execution for representation in combat models in the context of the prevailing tactics, techniques and procedures (TTPs) and concepts of operations (CONOPS).

Modeling Political, Military, Economic, Social, Information, & Infrastructure Factors to Support Strategic Education

AbstractID: 50

LTC Edward McLarney, USA
US Army War College
650 Wright Ave
Carlisle Barracks,PA 17013
717-245-3251
edward.mclarney@us.army.mil

Mr. Daniel Snyder
JFCOM J9 BAH
115 Lake View Parkway
Suffolk,VA 23435
757-203-3245
Daniel.Snyder@je.jfcom.mil

Mr. Paul Everson
BAH
8283 Greensboro Drive
McLean,VA 22102
703-902-4598
Everson_Paul@bah.com

Mr. Matthew Wilson
Simulex, Inc.
3482 McClure Blvd
West Lafayette,IN 47906
765-463-2699
mwilson@simulexinc.com

Emerging PMESII modeling capabilities can provide useful support in strategic education settings; these innovative techniques warrant additional research & development along with continued application in exercises. Appropriate use of PMESII models can enhance the way we "train the way we fight."

Today's operational environment calls for senior officers to exhibit expertise in applying diplomatic, information, military, and economic (DIME) action to achieve the appropriate complex PMESII effects. The US Army War College's Strategic Decision Making Exercise (SDME) is the annual capstone exercise for Army War College students; it challenges them with a variety of conflicting situations across the DIME / PMESII spectrum. Strategic combat and logistics models have typically lent rigor and credibility to the exercise, while subject matter experts have provided PMESII input. For SDME 2008, analysts at the USAWC's Center for Strategic Leadership teamed with USJFCOM to model PMESII

effects in one geographic region for a 2021 scenario. The team used Booz Allen Hamilton's Integrated Gaming System (IGS) in a federation with Simulex's Synthetic Environments for Analysis & Simulation (SEAS).

The team successfully conducted PMESII modeling capability briefs, exchanged existing scenario information, modeled the scenario, ran the scenario through several courses of action, and backbriefed the results sufficiently for the scenario development team to assess the utility of the simulation derived products. While SDME execution will occur in March 08, the final exercise preparation and conduct of the exercise will leverage the work referenced above. This MORS presentation will highlight the PMESII-specific process employed to identify appropriate models, define requirements, set up the scenario, define COAs, run the models, interpret & present the results, evaluate the effort, provide ideas for improvement, and formulate a way ahead. USJFCOM representatives will include a synopsis that shows how IGS and SEAS were federated and employed to support the academic environment. Finally, the team will discuss the importance of focusing on results (in this case, student learning), rather than focusing on the model.

STORM: Improved Capabilities & Maritime Integration

AbstractID: 299

Mr. Michael McMillie, USAF
AF/A9IT
1777 N. Kent Street
Rosslyn,VA 22209
703-588-8671
Michael.McMillie@pentagon.af.mil

LCDR Jeffrey Debrine, USN
Deputy Chief of Naval Operations Assessment Division
2000 Navy Pentagon
Washington,DC 20350
703-693-8743
jeffrey.debrine@navy.mil

The Synthetic Theater Operations Research Model (STORM) is replacing THUNDER as the USAF's premier campaign model for providing a means to assess Joint capabilities for future acquisitions as requested and defined by the US combatant commanders. This presentation addresses two broad topics. First, it presents an overview of STORM and why the USAF made the transition from THUNDER, a model primarily developed for large Cold-War force-on-force scenarios. For example, characteristics such as architecture, data, and individual Service representations are discussed. Second, it looks at STORM's evolving role in assessing capability gaps, potential impact of acquiring a weapon to supply the capability, and employing that weapon in a Joint combat environment. Specifically, the presenters will indicate the status of ongoing and planned collaboration between the USAF and the US Navy to improve STORM's ability to model of maritime operations.

Campaign Analysis – Improving the Representation of the Joint Fight

AbstractID: 137

Mr. Jim McMullin, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 20170
703-806-5644
DSN: 656-5644
james.mcmullin@us.army.mil

Campaign Analysis for Major Combat Operations continues to play a prominent role in Department of Defense studies. Many of the models used to conduct Campaign Analysis were designed to address large scale force-on-force interactions and do not address recent changes in the operational environment.

At the Center for Army Analysis (CAA) recent efforts have focused on improving both the Campaign Analysis process and the Campaign Analysis models to provide better analysis for decision makers. CAA has enhanced the quality of Campaign Analysis process in part by conducting Front End Analysis (including wargaming) that provide modelers more refined Courses of Action to implement in the models. The Combat Sample Generator (COSAGE) Model, used to provide killer-victim data to campaign models, now provides many different samples of combat to improve the representation of force mixes and terrain types. COSAGE has also enhanced the representation of infantry battles which better replicates small arms combat. The Joint Integrated Contingency Model (JICM), used to conduct theater-level analysis, was revised to account for force-ratio changes in units. The representation of Air Forces in JICM was improved by developing a routine that dynamically generates sortie allocation based on enemy strength. The Air play was also enhanced with the implementation of terrain-based degrades for air-ground munitions.

This presentation describes the Campaign Analysis improvements made to date and discusses potential future directions. The net effect of these enhancements is a much more realistic and accurate representation on the entire joint campaign, including the contribution of Army, Navy, Marine, and Air Forces to the joint fight.

Using Discrete Event Simulation To Support Hospital Bed And Operating Room Hour Requirements Determination

AbstractID: 64

Mr. PAT M MCMURRY, USA
Center for AMEDD Strategic Studies
1608 Stanley Road, Ste 47, Bldg 2268
Fort Sam Houston,TX 78234-5047

210-221-9404
pat.mcmurry@us.army.mil

Quantifying hospital bed and operating room hour requirements is essential for force design, force programming and operational planning. In addition, determining the best mix of intensive care, intermediate care and minimal care beds and operating rooms is critical to the redesign of the Army's Combat Support Hospital. The Center for AMEDD Strategic Studies is developing a discrete event simulation model that uses current empirical data to support these requirements. This simulation will replace three legacy models that use subject matter expert derived data that is not validated. This presentation will provide the background on the conceptual model, the supporting data and the model development current status.

Verification and Validation of Integrating the HPAC Model into the Joint Analysis System (JAS)

AbstractID: 367

Mr. Peter B Melim
CACI, Inc.
1600 Wilson Blvd, Ste 1400
Arlington,VA 22209
703-558-0276
FAX: 703-875-2904
pmelim@caci.com

Dr. John Prince
CACI, Inc.
1600 Wilson Blvd, Ste 1400
Arlington,VA 22209
703-558-0259
FAX: 703-875-2904
jprince@caci.com

The Weapons of Mass Destruction (WMD) representation in the Joint Analysis System (JAS), a theater-level campaign simulation model, has recently been upgraded to allow for a more robust capability to model the planning and execution of WMD operations. The Defense Threat Reduction Agency (DTRA) sponsored these enhancements to provide them the capability to properly model WMD counterforce weapons and weapons systems. A key element of these enhancements was the ability to link JAS directly to the Hazard Prediction and Assessment Capability (HPAC) model for dynamic cloud creation. Previously, explicit chemical clouds in the JAS battlespace were created during run execution from stored chemical cloud data. This required storing large quantities of cloud data for all possible release conditions and cloud durations. The JAS-HPAC integration enhancement allows HPAC to create the clouds dynamically, during run execution, and pass the results back into JAS, through a cloud aggregation algorithm to instantiate the chemical clouds in the battlespace. This paper presents the methodology and results of a separate task to verify and validate the cloud representation in JAS when using HPAC integrated into the JAS execution environment.

Exploring the WMD Enhancements within the Joint Analysis System (JAS)

AbstractID: 369

Mr. Peter B Melim
CACI, Inc.
1600 Wilson Blvd, Ste 1400
Arlington,VA 22209
703-558-0276
FAX: 703-875-2904
pmelim@caci.com

Mr. Walt Richert
CACI, Inc.
1600 Wilson Blvd, Ste 1400
Arlington,VA 22209
703-558-0280
FAX: 703-875-2904
wrichert@caci.com

The Joint Analysis System (JAS) is a theater-level campaign simulation model that models the full joint warfight and has the flexibility and scalability to model many of the irregular, disruptive, and catastrophic aspects of military and homeland defense operations. Since, OSD/PA&E has incorporated JAS into their strategic M&S toolkit and has an on-going commitment to develop Defense Planning Scenarios (DPS) in JAS, the Defense Threat Reduction Agency (DTRA) has embarked on an effort to use JAS for assessing their Counterforce weapons and weapons systems at the campaign level. Recent enhancements to the representation of Weapons of Mass Destruction (WMD) now provide analysts a much more robust representation of the planning and execution of counterforce weapons and weapon systems. These modifications include a more integrated collection planning process to support targeting WMD targets, and explicit detection and tracking of chemical and biological clouds through a new ISR Operations command and control (C2) function. In addition, the chemical and biological cloud creation process has expanded to support an integrated, dynamic use of the Hazard Prediction and Assessment Capability (HPAC) model. And finally, a new Biological Infections capability has been added to assess the impacts of infectious diseases within the campaign with an initial representation of medical treatment of infected units. This paper presents the exploration of these enhancements and what it means to the Joint campaign analysis community in the fields of countering WMD and medical treatment.

Introduction to the Operating and Support Cost Analysis Model (OSCAM)

AbstractID: 424

Ms. Mary M Mertz, USN
Naval Surface Warfare Center, Carderock Division

Mr. Geoffrey Pawlowski, USN
Naval Surface Warfare Center, Carderock Division

9500 MacArthur Blvd
Bethesda,MD 20817
301-227-4012
mary.mertz@navy.mil

9500 MacArthur Blvd
Betheda,MD 20817
301-227-3661
geoffrey.pawlowski@navy.mil

The Operating and Support Cost Analysis Model (OSCAM) is a family of tools developed and sponsored by the Naval Center for Cost Analysis to estimate operating and support (O&S) costs for current and future Naval weapon systems. The US OSCAM family of models includes: OSCAM Ship, OSCAM Shipboard Systems, OSCAM Air, OSCAM EFV, and OSCAM USAF. OSCAM is a system dynamics-based model, which provides a structured methodology for dealing with complex systems having many interacting components. This approach enables the user to capture the dynamic behavior of a system while allowing for a flexible design, which can easily be enhanced and expanded. For example, the model provides the capability to quickly assess the impact of different maintenance philosophies and OPTEMPO scenarios on cost and availability. Model outputs include cost, availability, and man-hours, as well as other metrics. One of the features that sets OSCAM apart from most cost estimating models is that historically-based data sets are provided with the model. These data sets are primarily based on data from the Naval Visibility and Management of Operating and Support Costs (VAMOSC) database and are updated annually. OSCAM has been used to develop program life cycle cost estimates, proposal evaluations, source selections, analysis of alternatives, and in numerous what-if drills and scenarios. The model and model training are currently offered free of charge to government personnel and government sponsored contractors. OSCAM Ship, Shipboard Systems, and Air are certified for use on the NMCI network. More information on OSCAM can be found at www.oscamtools.com.

This presentation will focus on providing an introduction to the OSCAM tool, particularly the model's capabilities and its applications throughout DoD.

Use of Surveys in the Counter-Insurgency Fight in Afghanistan

AbstractID: 352

MAJ John Michaud, USA
TRADOC Analysis Center
255 Sedgwick Ave.
Fort Leavenworth,KS 66027
913-684-3330
DSN: 552
john.michaud@us.army.mil

Combined Joint Task Force 82 (CJTF-82) deployed 15 months fighting the insurgency in Afghanistan. Since an insurgency cannot exist without the support of the population, gauging what the population thinks and feels is critical to the counter-insurgency fight. Surveys have proven to be invaluable tools that allow the task force to keep its finger on the pulse of the local population and to assess the status of the operational environment. CJTF-82 sponsored a series of Afghan Public Perception Surveys (APPS) that collected data on three lines of operation: security, development, and governance. These monthly surveys provided the command with answers to questions such as: what do Afghans think about the Taliban, how safe do Afghans feel while conducting their daily business, do Afghans have access to clinics or hospitals, how do Afghans feel about their police force and their provincial governor? Trending the answers to these questions also gave CJTF-82 insights into the conduct of their campaign. This presentation will include results of the APPS surveys as well as considerations for conducting surveys within a unique culture and in a combat environment to yield reliable results.

Experimentation Community of Practice: Status of Collaboration

AbstractID: 96

Mr. Kirk Michealson
Lockheed Martin Center for Innovation
7021 Harbour View Blvd, Suite 105
Suffolk,VA 23435
757-935-9501
FAX: 757-935-9563
kirk.a.michealson@lmco.com

One of the overall recommendations from the 2006 MORS Workshop on Bringing Analytic Rigor to Joint Warfighting Experimentation was to create an active collaboration working group of Joint Experimentation within the MORS annual symposium. The first meeting was held at the 75th MORSS and WG 33, Analytical Rigor in Experimentation, sponsors the Experimentation Community of Practice (COP).

During every annual symposium, the Experimentation COP has their annual face-to-face meeting during one of Working Group 33's WG Sessions. At the 76th MORSS, the COP Leadership will provide updates on what has been accomplished during their first year in existence and what is planned for the future. In this working session, statuses will be provided on the Experimentation Lexicon, an Experimentation Directory, a listing of Experimentation Methods and Tools, and their collaboration site in the Joint Knowledge On-line (JKO) workspace.

The Experimentation COP Leadership is looking for volunteers to lead and work on their upcoming tasks, including an Experimentation "How To" Guide, Experimentation Training, Recommended Reading List, an Experimentation Peer Review Program, and establishing better ties with the Test & Evaluation and Wargaming communities.

Please plan on joining us and being a member of the first active community of practice within MORS!

Strategy, Policy, and the War on Terror: Understanding and Exploiting System Dyn

AbstractID: 43

MAJ Nathan A Minami, USA
Department of Systems Engineering
United States Military Academy
West Point,NY 10997
845-938-5525
DSN: 938-5525
FAX: 845-938-5665
nathan.minami@us.army.mil

Five years into the War on Terror, there appears to be little progress globally in eradicating terrorism despite great efforts by numerous countries and U.S. government agencies. The intent of this study is to examine terrorism on a systems level, using System Dynamics Modeling to help better understand the complex non-liner feedback and delays inherent in the system. Simulation of the model provides numerous insights that may help create and direct future strategy and policy. This paper will discuss the literature and data collected and used in model formulation and calibration, and will discuss the insights found from model simulation. Among these insights is the importance of addressing the root causes of terrorism such as political isolation, poverty, governmental oppression and perceived unfairness in U.S. policies. This paper also offers insight as to how the military and other governmental agencies might better be applied in the War on Terror.

Metalogistics and the O&S Cost Trade Space

AbstractID: 356

Mr. Terry J Mitchell
Lockheed Martin Mission Services
10901 W. Toller Drive, Suite 100
Littleton,CO 80127
720-479-3043
terry.mitchell@lmco.com

We discuss the relationship between supportability, operational availability, system capability, and mission effectiveness – all within the bounds of today's cost-constrained functional environment. This requires a change in viewpoint from that in which the "system supported" was viewed as a static, standalone entity; support effectiveness was limited with respect to predictability and affordability; and, cost was not a factor in determining overall system effectiveness. The new perspective must also embrace the reality that all functions of complex, integrated systems cannot be known prior to their deployment in the field.

Metalogistics is the development of a support system which views the "system supported" as a single design variable in a dynamic "system of systems". We present a fundamental equation of sustainability that considers inherent design characteristics of the functional system along with the effectiveness of the underlying support system to tie both to mission capability and, ultimately, mission success. We examine operational availability and its relationship to both cost and effectiveness as part of the O&S trade space. We consider how to optimize tech refresh rates and ask, what is the cost of complexity?

We develop an expression that relates the number of systems (over time) with system complexity to determine a "logistics footprint" expressed as cumulative expenditures over time. This expression can be differentiated to yield an instantaneous spending rate. Some work remains to calibrate that expression with the fundamental theorem of sustainability. Overall supportability effectiveness can be expressed as the ratio of operational availability to total expenses.

USCG INTEGRATED DEEPWATER SYSTEM (IDS) ALTERNATIVES ANALYSIS

AbstractID: 483

Mr. Charles M Mitchell
ABSG Consulting Inc
1525 Wilson Blvd, Suite 625
Arlington,VA 22209
703-682-7372
cmitchell@absconsulting.com

Ms. Kathleen S Kettel, USCG
USCG R&D Center
1082 Shennecossett Road
Groton,CT 06335
860-441-2770
kathleen.s.kettel@uscg.mil

Mr. Bert N Macesker, USCG
USCG R&D Center
1082 Shennecossett Road
Groton,CT 06335
860-441-2726
bert.n.macesker@uscg.mil

The United States Coast Guard has sponsored an independent Alternatives Analysis (AA) of possible ways to satisfy the Integrated Deepwater System IDS) Mission Needs of Record. The analysis addresses potential alternatives to IDS capabilities provided by the current National Security Cutter (NSC), Offshore Patrol Cutter (OPC), Fast Response Cutter (FRC), Medium Range Surveillance (MRS) Maritime Patrol Aircraft (MPA), Vertical Takeoff and Landing Unmanned Aerial Vehicle (VUAV), as well as the supporting C4ISR systems. The AA focused on the Coast Guard's overarching philosophy on technical risk in the fielding of new systems to satisfy the mission need and operational performance requirements. Where a wide range of proven and effective alternatives are currently available in the marketplace, developmental technologies are typically given less consideration due to increased risk. In instances where limited proven technologies currently exist, a greater reliance is typically placed on developmental technologies, with an emphasis on the most readily available and technically mature alternatives.

The analysis was conducted in accordance with the U.S. Coast Guard Major Systems Acquisition Manual (MSAM), Commandant Instruction Manual 5000.10. This presentation will describe the analysis process and analytical tools that were applied to conduct the study, which is made up of the phases listed in Table 1.

Table 1. Overview of AA Methodology
Phase I (Validation Phase)

• Review Mission Needs Statement (MNS)
• Review Approved departures from baseline MNS or CONOP, if any
• Initiate Market Technology Review
• Identify Analysis Assumptions
• Develop Detailed Analysis Plan including Evaluation Criteria (MOEs)
Phase II (Analysis Phase)
• Complete Market Technology Review
• Define Alternatives
• Define Lifecycle Costs of Viable Alternatives
• Conduct Cost Benefit Analyses of Viable Alternatives
• Define ROI for Viable Alternatives
• Evaluate Alternatives against Phase I Criteria
• Prioritize Alternatives
• Develop Preliminary Recommendations
• Prepare "Outlook" (Quick Look) Report
Phase III (Recommendations)
• Conduct Sensitivity of Analysis to Alternative Assumptions
• Validate Recommended Options based on DHS & OMB Draft Outlook Input
• Complete Draft Report
Phase IV (Final Report)
• Final Report submitted for approval to OMB and forwarding to Congress

Applying Crime Mapping and Analysis Techniques to Forecast Insurgent Attacks in Iraq

AbstractID: 59

Capt Joseph Mlakar, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
joseph.mlakar@usmc.mil

Maj Paul Schneider, USMC
Marine Corps Wounded Warrior Regiment
3280 Russell Road
Quantico,VA 22134
703-432-9380
paul.schneider@usmc.mil

MAJ Andy Farnsler, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir ,VA 22060
703-806-5562
andy.farnsler@us.army.mil

Mr. Douglas Hoffman, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8181
douglas.hoffman@usmc.mil

When and where will the next insurgent attack occur? Commanders in Iraq struggle to answer this question on a daily basis. Prior to this analysis, there was minimal use of advanced analytical techniques to make actionable forecasts as to the location and timing of future attacks. Instead, units would describe general trends in insurgent activity over time by displaying aggregated data on simple bar charts and static "dot-maps." These rudimentary approaches yielded little insight into insurgent behavior at the tactical level and did not result in useful forecasts or actionable recommendations for commanders.

In this research, we apply crime mapping and analysis techniques to forecast the location and timing of insurgent attacks. Insurgent activity in Iraq more closely resembles serial crime than traditional military operations. The analysis of criminal activity centers around one fundamental concept: there is no truly random behavior. A criminal cannot fully "randomize" his attacks – he is human and uses a logical decision model to make his choices. Any behavior that follows a decision model will set patterns – we simply need to use proven crime analysis techniques to find these patterns.

We begin by finding series of attacks that are logically linked to the same insurgent or insurgent group (and, thus, the same underlying decision model). Each series is analyzed spatially and temporally in order to identify patterns in (1) static factors such as location, time of day, and day of the week and (2) dynamic factors such as the time between events, distance between events, and movement pattern. We demonstrate through case studies how these analytical techniques have been tremendously successful in forecasting insurgent attacks in Iraq.

Warfighting Payoff Analysis in Support of IHPRPT Beyond-Phase-III Goals

AbstractID: 456

Mr. Paul F Mondragon
NAWCWD
1900 N. Knox Rd. M/S 6207
China Lake,CA 93555-6106
760-939-5980 DSN: 437-5980
FAX: 760-939-2232
paul.mondragon@navy.mil

Determining how to invest the limited resources available with the propulsion technology area has become crucial in this time of decreased funding and increased need. The objective of this study was to quantify the warfighting payoff of improvements in several different rocket

motor parameters to support the identification of beyond-phase-III goals for the Integrated High-Payoff Rocket Propulsion Technology (IHPRPT) Program. In the execution of this study the rocket propulsion parameters, as well as the ranges of those parameters, to be examined was determined. Modeling and Simulation was then used to determine the impact of the changes to the rocket propulsion parameters on the performance of selected weapon systems (SEAD/DEAD, Ship-Self Defense, Beyond Visual Range Air-to-Air, Rotary Wing Direct Attack). The warfighting Measures of Effectiveness (MOEs) were then quantified for baseline and improved versions of these weapon systems in a series of simulated mission-level combat vignettes. Finally, the propulsion parameters were rank-ordered in terms of payoff to the warfighter and “knees in the curve” were identified for the examined parameter levels.

Geo-Based Optical Space Surveillance (G-BOSS) Concept Military Utility Assessment Overview

AbstractID: 97

Ms. Monica Montoya, USAF AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFB,NM 87117 505-853-6196 DSN: 263 monica.montoya@kirtland.af.mil	**Ms. Lynda Liptak** ARA 4300 San Mateo Blvd., NE, Suite A-220 Albuquerque,NM 87110 505-816-6364 lynda.liptak@ara.com	**Mr. Gary Fauss** ATK 5011 Indian School Suite 500 Albuquerque,NM 87110 505-853-6078 DSN: 263 gary.fauss@kirtland.af.mil
Mr. Brian Spanbauer ATK 5011 Indian School, Suite 500 Albuquerque,NM 87110 505-853-3662 DSN: 263 brian.spanbauer@kirtland.af.mil	**1st. Lt Judson McCarty, USAF** AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFB,NM 87117 505-846-2635 judson.mccarty@kirtland.af.mil	**Capt. Jermaine Sailsman, USAF** AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFB,AK 87117 505-846-7039 jermaine.sailsman@kirtland.af.mil

The Geosynchronous (Geo)-Based Optical Space Surveillance (G-BOSS) concept was developed by the Air Force Research Laboratory’s Space Vehicles Directorate (AFRL/RV) Simulation and Technology Assessment branch (AFRL/RVES) to support a military utility assessment (MUA) of key emerging AFRL technologies applicable to the Space Situational Awareness (SSA) mission area. The concept involves a Geo-based, Geo-focused, characterization quality visible-wavelength imaging asset that can be responsively tasked predominantly to support tactical space event and anomaly resolution, routine blue force deployments and Intelligence Preparation of the Battlespace. The MUA will examine G-BOSS system variants as parametrically defined through variation of 4 key performance parameters (sensor resolution, sample rate, data storage capacity and downlink rate), in constellation sizes of 4, 8 and 24 satellites. The mission level model created with the System Effectiveness Analysis Simulation (SEAS) tool is based on our G-BOSS employment concept and explores a wide range of issues such as mission planning and constellation optimization in order to satisfy a variety of qualitative, quantitative and timeliness tasking constraints while minimizing overall constellation Delta-V expenditure. This briefing will outline the G-BOSS system concept, system-of-systems concept of employment, MUA study design, and outline planned areas for future study excursions.

Finite State Machines for Creating, Evaluating, and Refining Air-to-Air Combat Tactics

AbstractID: 260

Mr. Jay Moore The Johns Hopkins University Applied Physics Laboratory 11100 Johns Hopkins Rd Laurel,MD 20723 443-778-2861 jay.moore@jhuapl.edu	**Mr. Michael Pekala** The Johns Hopkins University Applied Physics Laboratory 11100 Johns Hopkins Rd Laurel,MD 20723 443-778-4619 michael.pekala@jhuapl.edu	**Mr. Russell Turner** The Johns Hopkins University Applied Physics Laboratory 11100 Johns Hopkins Rd Laurel,MD 20723 443-778-7813 russell.turner@jhuapl.edu

Unmanned Aerial Vehicles (UAVs) are already in wide use as ISR platforms and are beginning to take on air-to-ground weapons delivery roles as well. Their use in air-to-air roles will inevitably follow. Air-to-air combat tactics are a complex art, and developers of automated control systems are unlikely to possess the knowledge and skills to create effective tactics; yet practicing fighter pilots do not possess the programming skills to express their knowledge in the form of traditional computer programs or algorithms. We present a method of creating complex autonomous control systems graphically using finite state machines and monitoring their execution in real time, and describe how this system could be applied to allow skilled warfighters to develop air-to-air combat tactics in the field and update them dynamically based on the observed response of our adversaries. We will also show that adding a finite state machine representation of the aircraft dynamics allows one to mathematically prove or disprove statements about the tactics, such as, "Using this tactic will result at worst in a draw." In addition to control of UAVs, this method may also be used to develop tactics for simulated air-to-air combat.

Empowering Coast Guard Decision Makers Through the Use of the Maritime Security Risk Analysis Model

AbstractID: 518

Mr. Matthew D Mowrer
ABS Consulting
10301 Technology Drive
Knoxville,TN 37931
865-335-7280
mmowrer@absconsulting.com

LCDR Brady C Downs, USCG
Domestic Port Security Evaluation Division
2100 2nd St. SW
Washington,DC 20593
202-372-1173
Brady.C.Downs@uscg.mil

The Maritime Security Risk Analysis Model (MSRAM) has helped to evolve the way that the United States Coast Guard (USCG) makes decisions within their Ports, Waterways, and Coastal Security Mission. This paper examines how risk information, generated within MSRAM, has been used to guide decisions at all levels of the organization to help steer limited resources in the right direction in the cost-effective manner.

At the national level, MSRAM results have been used to help (1) inform long-term strategic resource planning, (2) identify the capabilities needed to combat future terrorist threats, (3) characterize the nature of the highest risk scenarios and targets in the maritime domain, (4) shape regulations, (5) guide technology deployments, and (6) prioritize geographic priorities for the Port Security Grant Program.

At the regional level, MSRAM results have given the Area and District commanders a new perspective on where the greatest risks lie within their Areas of Responsibility, helping to identify clustering of high risk targets. This perspective has been used to focus operational activities, including patrols, boardings, escorts, and fixed security zone enforcement against the highest risk targets. The information has also been used to help distribute limited capabilities, such as small boat-mounted automatic weapons to boat stations responsible for the most high risk targets.

At the local level, MSRAM has been used to support tactical planning efforts for steady state and surge operations. The results have also been leveraged by the Area Maritime Security Committees to help inform their strategic risk management planning efforts, port security grant proposal evaluations, and their local contingency planning efforts.

A Validation Framework for Validating an Irregular Warfare (IW) Simulation Using Pythagoras

AbstractID: 310

Ms. Lisa J Moya
WernerAnderson, Inc.
6596 Main Street
Gloucester,VA 23061
804-694-3173
FAX: 804-694-3174
lmoya@werneranderson.com

The Marine Corps Combat Development Command (MCCDC) Operations Analysis Division (OAD) is considering simulation models for future entry into the USMC Irregular Warfare (IW) Analytic Baseline. One simulation paradigm under consideration is agent based simulation. Agent based simulations present a challenge for validation in support of analytic applications, especially in the realm of Irregular Warfare IW, due to sparsity of data and simulation complexity. To evaluate the feasibility of agent based simulation in analytic applications the MCCDC OAD funded phase one of the U.S. Marine Corps (USMC) Agent-Based Simulation (ABS) Verification, Validation, and Accreditation (VV&A) Framework Study with phase two funded by the Modeling and Simulation Coordination Office (M&SCO). The purpose of phase one was to create a framework for performing VV&A on models. The study's primary effort was on the validation process with verification and accreditation addressed with respect to their interdependencies with the validation process. Phase two of the study elaborated on the framework and tested it against the Pythagoras implementation of a Columbian IW scenario for an analytical application as a proof of concept. The result from this study is a transparent, traceable, and reproducible methodology of validating these simulations based in the scientific method. This briefing gives an overview of the framework using results for the Columbian IW scenario to illustrate the methodology.

Analysis of a Tactical Course of Action Given a Postulated Threat Against a US Air Force Base

AbstractID: 426

Maj. Gilbert D Ness, USAF
USPACOM/J84
Box 64028
Camp HM Smith,HI 96861-4028
808-477-7867
DSN: 315-477-7867
FAX: 808-477-7879
gilbert.ness@pacom.mil

USPACOM/J84 performs qualitative and quantitative analysis in support of deliberate plan development and examination of alternatives. In one scenario of interest to USPACOM, there is potential for threat attack on air bases. This study assessed some of the operational implications of one potential mitigating strategy (an alternative air basing plan) on the subsequent ability to maintain required levels of defensive counter air capability.

Mathematical Perspectives on the Federal Thrift Savings Plan

AbstractID: 190

LTC Scott T Nestler, USA
U.S. Military Academy at West Point
211C Barry Rd
West Point,NY 10996
845-938-5168
DSN: 688-5168
scott.nestler@usma.edu

In this presentation, we will examine several aspects of the Federal Thrift Savings Plan (TSP) from a mathematical perspective, including:

• How are the L (Lifecycle) Funds constructed and why might they be of interest (or not) to you?
• What happens if stock and index fund returns are not assumed to be Normally-distributed, as is usually done?
• How does choosing a measure of risk other than variance affect optimal portfolio choice?

DISCLAIMER: You will not receive any personal financial advice during this talk; however, it is intended to get you to think about one of the retirement savings options available to you.

Interactive Army Campaign Plan

AbstractID: 191

LTC Scott T Nestler, USA
U.S. Military Academy at West Point
211C Barry Rd
West Point,NY 10996
845-938-5168
DSN: 688-5168
scott.nestler@usma.edu

Mr. Marc Eskew, USA
U.S. Military Academy at West Point
Mahan Hall
West Point,NY 10996
845-938-5168
DSN: 688-5168
marc.eskew@usma.edu

The Army Transformation Office, Army G3/5/7 is responsible for developing, publishing, and synchronizing the Army Campaign Plan (ACP). The ACP directs planning, preparation, and execution of Army transformation and Service Title 10 activities. Annex A (Army Organizations) provides information on the organization of the Army Modular Force, including steady state posture, unit designation, service command and control relationships, and stationing after completion of modular conversion. Originally, Annex A consisted of a few pages of text, 26 tables, and 26 maps generated with a graphics program. The Army Transformation Office desired a more interactive version of Annex A as the first step in the development of a more automated ACP process management tool. This presentation details the development of a data implementation of Annex A to the ACP, including a number of views including: current view, stationing view, "readiness" (personnel and equipment) view, and a timeline view.

Vehicle Health Management System Business Case Analysis

AbstractID: 192

LTC Scott T Nestler, USA
U.S. Military Academy at West Point
211C Barry Rd
West Point,NY 10996
845-938-5168
DSN: 688-5168
scott.nestler@usma.edu

The Vehicle Health Management System (VHMS) provides the US Army with an improved sustainment capability for Heavy Brigade Combat Team (HBCT) platforms that can be migrated into Stryker Brigade Combat Team (SBCT) vehicles and other Program Executive Office (PEO) Ground Combat Systems (GCS) platforms. The VHMS is an integrated, self-reporting, self-validating system with on-board and off-board segments linked through an open information architecture. The VHMS Program was developed to reduce HBCT vehicle life cycle costs and improve sustainment capabilities for the warfighter.

VHMS capabilities are focused on: combat readiness assessment, equipment fault identification and resolution, Condition Based Maintenance (CBM), bulk fuel and ammunition requirements and resolution, GCS configuration, and asset/component usage management. The objectives of VHMS are: improved situational understanding of GCS status, maximizing combat mission readiness through proactive vehicle health maintenance, reduced overall sustainment costs, self reporting and self-sustaining systems that push repair forward, maximizing future combat technology integration capability.

The VHMS Team is a combination of government, contractor, research, and academic personnel. Functionally, the VHMS Team is organized into a number of Integrated Process Teams (IPTs). The Diagnostic/Prognostic/Condition-Based Maintenance (D/P/CBM) IPT supports the VHMS Program with a thorough understanding of the needs and requirements for implementation of diagnostics and prognostics where the technology will provide the greatest benefit and a thorough understanding for implementing a CBM capability for all Army platforms. The goal of this IPT is to increase cost beneficial onboard situational awareness through D/P/CBM efforts, increase the level of diagnostics on each platform to save support costs and labor, and incorporate prognostics into each platform.

Counter-SOF Study

AbstractID: 134

LCDR John Nguyen, USN USFK - Operations Analysis Branch FKJ3-PL-OAB, PSC 303, Box 27 APO,AP 96204-3027 315-723-3966 DSN: 315-723-3966 john.l.nguyen@korea.army.mil	**Mr. Thomas Bothwell** USFK - Operations Analysis Branch FKJ3-PL-OAB, PSC 303, Box 27 APO,AP 96204-3027 315-723-6012 DSN: 315-723-6012 tom.bothwell@korea.army.mil

A comprehensive in-theater analysis of Special Operation Forces (SOF) insertion with analysis of CONOPS to counter the insertion in the Korea Theater of Operation (KTO). The study incorporates air, ground, and maritime SOF issues that will inform leadership of key insights and recommend a functionally-based approach to this threat.

High Capacity Communications Capability (HC3) Analysis of Alternatives

AbstractID: 363

Ms. Cindy Noble, USA TRADOC Analysis Center 255 Sedgwick Ave. Fort Leavenworth,KS 66027 913-684-3259 cindy.noble@us.army.mil	**Mr. Bruce Gorski, USA** MITRE 401 Delaware, Suite 200 Leavenworth,KS 66048 913-946-1908 bgorski@mitre.org

The High Capacity Communications Capability (HC3), as envisioned, is a deployable satellite communications (SATCOM) ground terminal for use at echelons above brigade (EAB). Acquisition of satellite ground terminals requires a significant investment by the Department of Defense (DoD), which consequently requires a rigorous assessment of terminal alternatives to inform acquisition decisions. The typical AoA directive describes the alternatives as the obligatory “current, upgraded, and new start” systems, often vaguely defined. The HC3 AoA directive was no different in that it tasked that the study alternatives comprise current and programmed systems, upgraded current and programmed systems, joint and commercial systems and the HC3 new-start concept. This required a dedicated effort to transform the ill-defined alternatives, including multiple Service systems, into a well-defined competitive list suitable for the AoA.

The alternative development process also contributed to a more robust list of attributes for comparing the alternatives. The study team identified some unique metrics related to satellite terminals and their attributes, to include assessing system upgradability. Upgradability considers policy-driven hardware and software satellite terminal improvements and the future costs of those improvements. To fully assess the upgradability, the study methodology required a different approach for the cost analysis portion.

This presentation addresses the rigorous approach the study team used to clearly define the competitive alternatives. It also addresses the unique metrics the team developed to compare the alternatives. Finally, the presentation will include the approach the study team used for the cost analysis.

Modeling Civilian Movement in Large-Scale Scenarios

AbstractID: 388

Dr. Ronald W Noel, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-7089
DSN: 258-7089
FAX: 575-678-8074
ron.noel@us.army.mil

In the past, large-scale scenarios focused on the force-on-force effects found in convention warfare in the setting of Major Combat Operations (MCO). Civilians on the battlefield were considered incidental to military operations and, for the most part, were not modeled. In order to represent asymmetric and irregular warfare, large-scale scenarios have focused increasingly on urban combat in which the enemy uses civilians to their tactical and strategic advantage. Civilian movement on the battlefield creates additional clutter to be detected by sensors and restricts maneuver when civilians are near the area of operations. While operational realism in modern combat simulations requires portrayal of civilian populations, the impacts of modeling civilian movement in large-scale scenarios are significant. To represent civilian movement and portray realism associated with civilians on the battle field, the Move and Soon Forget (MASF) algorithm was developed. The MASF produces realistic, yet random, movement for pedestrians and vehicular civilians in simulations using agent-based models. The algorithm enables 30 simulated hours of civilian movement per hour of real time in a COMBATXXI scenario. The lessons learned in applying MASF to large-scale scenarios will be discussed.

Modeling Complex Threat Behaviors

AbstractID: 389

Dr. Ronald W Noel, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-7089
DSN: 258-7089
FAX: 575-678-8074
ron.noel@us.army.mil

Historically, the representation of Threat in large scale combat simulations has included simulation entities fighting as individuals. Any group dynamic has been achieved through a priori scripting of shared knowledge or synchronizing effects. Scripting of dynamic decisions is cumbersome, resulting in few decisions at high echelons. Threat behaviors can be implemented more easily by deploying simulation entities as teams. Fighting teams provide a more realistic representation and offer tactical advantages over aggregated individuals, such as in the massing of fires. The use of agents brings advantages in the flexibility and variability of outcomes through dynamic recognition of events that trigger coordinated team activities. The application of Threat teams to scenario development will be discussed.

Social Effects of Proximity in Scenario Development

AbstractID: 390

Dr. Ronald W Noel, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-7089
DSN: 258-7089
FAX: 575-678-8074
ron.noel@us.army.mil

Historically, scenario development has not represented the effects of social interaction. Research has established that social proximity is strongly related to information flow and reduction of biases between social groups. Social proximity is measured as the amount of time that individuals are in social contact (in other words, share the same space in which social exchange is possible). The representation of social proximity in scenario development will be discussed, including the development of dynamic measures of social proximity in response to changing events in the scenario. Additionally, a theoretical causal model will be discussed as a way to relate simulated measures of proximity to reality.

Communications and Infrastructure Model Integration

AbstractID: 477

Ms. Laura A Nolan
JHU/APL
11100 Johns Hopkins Road
Laurel,MD 20723
240-228-8495
laura.nolan@jhuapl.edu

Dr. Kevin Wedeward
New Mexico Tech
801 Leroy Place
Socorro,NM 87801
575-835-5708
wedeward@ee.nmt.edu

Ms. Mary A Horejs
NTOC
9800 Savage Road
Fort Meade,MD 20755
240-373-1785
mahorej@nsa.gov

Cyber Intelligence Preparation of the Environment (CIPE) is the process of identifying, organizing, and analyzing information about the adversary's cyber environment to support leadership decision-making. A cyber communications network is often connected to other infrastructures such as an electric power grid or railroad control network, opening the possibility that effects in one domain may have impacts on another. Events in any of the domains are likely to depend upon human interfaces and have effects upon human interactions and decisions. Models and simulations of the various domains can be integrated to enhance the CIPE process and improve understanding and analysis of the complex relationships that exist.

This presentation will show a prototyped integration of a realistic cyber communications network model, electric power grid model, and human impact model. The interdependencies between the models, requirements to link them in an integrated simulation, and challenges encountered during the process will be discussed.

Removing Human Errors From Human-In-The-Loop Simulation Exercises

AbstractID: 80

Mr. Michael J O'Connor, USA
Center For Army Medical Department Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234-5047
210-221-0209
DSN: 471-0209
FAX: 210-221-9119
michael.james.oconnor@amedd.army.mil

Mr. Pat M McMurry, USA
Center For Army Medical Department Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234-5047
210-221-9404
DSN: 471-9404
FAX: 210-221-9119
pat.mcmurry@amedd.army.mil

Mr. George W Hausler, USA
Center For Army Medical Department Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234-5047
210-221-2644
DSN: 471-2644
FAX: 210-221-9119
george.hausler@amedd.army.mil

LTC Lawrence V Fulton, USA
Center For Army Medical Department Strategic Studies
1608 Stanley Road, Suite 47
Fort Sam Houston,TX 78234-5047
210-295-8632
DSN: 421-8632
FAX: 210-221-9119
lawrence.fulton@amedd.army.mil

Human errors in the medical evacuation process in Human-In-The-Loop (HITL) Simulation Exercises (SIMEXs) have made the medical evacuation output data unusable. However, the complex HITL processes preceding the medical evacuation process are well documented and produce usable casualty data. By writing modeling software that correctly simulates the HITL medical evacuation process and uses casualty data from HITL SIMEXs, the Army Medical Department Center & School (AMEDDC&S) has a useful product for evaluating evacuation requirements from HITL SIMEXs.

Who's in charge anyway?

AbstractID: 450

Mr. Anthony J O'Connor
NTB
4340 Stream Bed Way
Alexandria,VA 22306
703-418-7068
anthony.j.oconnor@mdnt.com

The BMDS is an evolving world-wide system that will continue to grow as new assets and locations are added. The control and coordination of this system, which crosses Joint Combatant Command (COCOM) Areas of Responsibility (AOR), takes prior coordination and active collaboration. Several principles are involved, such as centralized planning, decentralized execution, unity of command and layered defense; but the open question is who can and should make the decisions on the conduct of the ballistic missile defense battle. Several factors are involved that deal both with the elements, communications and technology involved to identify who can best make an accurate and timely decision.

Working Group 4 Air and Missile Defense

A System Dynamics Approach to Strategic Communications Modeling

AbstractID: 117

Mr. Craig Oeltjen
US Strategic Command
901 SAC Blvd, Suite 2E18
Offutt AFB,NE 68113
402-294-0588
DSN: 271-0588
FAX: 402-294-8042
oeltjenc@stratcom.mil

Although not formally defined, Systems Thinking generally refers to a group of methods and principles designed to identify relationships between elements of a complex system. Benefits of this approach include an increased understanding of overall system operations or system physics. A common Systems Thinking output is a relationship diagram. This diagram (also know as cause and effect, influence, causal loop, and feedback loop diagrams) provides a qualitative depiction of systemic relationships. In some cases the identification of these key relationships may be adequate to answer the questions that were posed. But, in many cases there is a requirement to quantify the relationships in order to compare multiple courses of action or to estimate future values of key parameters. System Dynamics (developed by Jay Forrester at MIT in the 1960s) makes the transition from a qualitative relationship diagram to a quantitative simulation model by mathematically defining the links between system elements. The System Dynamics model provides a platform for experimentation that can be used to quickly investigate "what if" type questions for the system under consideration.

A model has been developed based on cause and effect diagrams that describe strategic communications operations. The purpose of the effort is to provide a proof of concept model for a System Dynamics approach in a deterrence-related environment. This presentation will describe model development and show sample analysis results. It will also include examples of how input variables can be controlled and how outputs can be displayed or exported.

Implementation of Verification and Validation (V&V) Attributes as a Practical Approach

AbstractID: 118

Mr. Joseph Olah
Science and Technology Corporation (STC)
500 Edgewood Road, Suite 205
Edgewood,MD 21040
410-679-1612x206
FAX: 410-679-0369
olah@stcnet.com

This paper describes an implementation of verification and validation (V&V) attributes as practical approach to assess whether the development program of a test event federation is “building the right thing right”.

Since test event federations are built to generate data for analysis and to aid decision-making, the objective of federation development should be to assure that the federation simulations are being built correctly to produce good data. Developers need to know whether the federations being integrated for the test event will meet the needs of the customer/evaluator. Likewise management needs to know the progress, obstacles, and direction the federation integration is taking.

A federation development program with a good V&V rigor will have at a minimum the seven attributes of understood intended use, proper planning, enabling coordination, known requirements, an agreed upon conceptual model, good software engineering, and effective documentation. The implementation is one of defining the issues associated with each V&V attribute then finding and assessing the measures that the developer will take to answer these issues.

The resulting assessment product shows the V&V rigor of a development process of a test event federation. The advantage of the implementation of this V&V attribute concept is that it allows software engineers to inform management of the direction, progress, and obstacles of federation development by simply explaining how they achieving the attributes of V&V.

Demonstration of Algernon Wargame

AbstractID: 114

Mr. Mike Ottenberg, OSD
OSD/PA&E/SAC
1225 S. Clark St., Ste 300
Arlington,VA 22202
703-699-2340
michael.ottenberg.ctr@osd.mil

OSD/PA&E/Simulation and Analysis Center has worked with project partners to develop a tool, the Algernon automated wargame, designed to inform decisionmakers on the key variables in irregular warfare analysis. The tool was showcased at the December 2007 MORS workshop. This demonstration is designed to reengage with the MORS analytical community. The primary scenario demonstrated will be unclassified; however, the tool is being developed to inform classified analytical agenda scenarios.

Overview of Analysis of Irregular Warfare Scenario

AbstractID: 146

Mr. Mike Ottenberg, OSD
OSD/PA&E/SAC
1225 S. Clark St., STE 300
Arlington,VA 22202
703-699-2340
michael.ottenberg.ctr@osd.mil

The Office of Secretary of Defense, Program, Analysis and Evaluation, Simulation and Analysis Center has been tasked with developing insights and ways ahead in the analysis of recently published Irregular Warfare Multi-Service Force Deployment (MSFD) scenario. Using a variety of methods, to include subject matter input from all services and defense agencies, interagency partners to include the Departments of State, Treasury, Energy, and other government agencies; input from multiple modeling tools such as NEXUS/REPAST, PSOM2, and a SAC developed commercial wargame derivative. All of this work is designed to further IW analysis and inform decision makers on the intricacies and complexity of this work.

DCGS-A: Mission Evaluation Focus Areas; Analytical Framework for the Sensor Feeds, Intelligence Fusion, Networks (Interoperability), Battle Command (Cognitive/Situational Awareness)

AbstractID: 404

Mr. Teddie Outland, USA	**Mr. John W Diem, USA**
U.S. Army Evaluation Center (AEC)	U.S. Army Operational Test Command
4501 Ford Avenue	91012 Station Ave.
Alexandria,VA 22302	Fort Hood,TX 76544
703-681-0872	254-288-9363
DSN: 761-0872	DSN: 738-9363
FAX: 703-681-3739	FAX: 254-288-1937
teddie.l.outland@atec.army.mil	john.diem@us.army.mil

This paper will briefly describe the Army's Distributed Common Ground System – Army (DCGS-A) overarching evaluation strategy and its associated Mission Evaluation Focus Areas: 1) analytical framework for the sensor feeds, 2) fusion, 3) networks, and 4) Battle Command (BC). From Battalion to Echelons Above Corps (EAC), DCGS-A will provide to the Warfighter a net-centric enterprise of ISR (Intelligence, Surveillance, and Reconnaissance), weather, geospatial, and space services. It will provide Commanders with the ability to access information and task organic sensors, as well as synchronize non-organic sensors with their organic assets. These services will be shared by Joint Commanders using the DCGS Integrated Backbone (DIB). All of the Services and the Joint community will use DCGS. The challenge for Operational Test Agencies (OTA), like ATEC (Army Test and Evaluation Command), is creating that realistic, Joint Net-Centric environment during operational and developmental test events. This is why the Operational Test Command (OTC) – in support of the Summer 2008 DCGS-A Limited User Test (LUT) – is integrating a Live, Virtual, and Constructive (LVC) Modeling and Simulation (M&S) Federation which leverages M&S found in the both Army and Joint training communities.

Space Radar Time Critical / Time Dominant Analysis

AbstractID: 420

Mr. Paul A Page	**Mr. John G Zierdt**
U.S. Army Space and Missile Defense Command	SAIC
BLDG 5220	6723 Odyssey Drive
Redstone Arsenal,AL 35898	Huntsville,AL 35806
256-955-1618	256-864-8386
DSN: 645-1618	FAX: 256-864-8288
FAX: 256-955-2250	John.g.zierdt.iii@saic.com
paul.page@smdc.army.mil	

The U.S. Army Space and Missile Defense Future Warfare Center (SMDFWC) conducted analysis in 2007 to quantify requirements for Time Critical (TC) tasking and Time Dominant (TD) delivery information requests from Space Radar. In order to conduct the analysis, SMDC used three functionally unique models to quantify results from a single vignette. A Space Radar CONOPS and Requirements model, SCORE, was used to determine the assets available and the associated coverage and quantity of taskings. The Joint Conflict and Tactical Simulation (JCATS), a warfighter-in-the-loop tool, was essential in developing the scenario and TTPs, understanding tactical implications, gathering qualitative and quantitative data, and providing input for closed loop modeling. The System Effectiveness Analysis Simulation (SEAS) provided the closed loop modeling of the JCATS data for statistical analysis. This briefing will highlight the methodology used to implement multiple models, ISR collection planning in open and closed loop simulations, and high level quantitative and qualitative results extracted to analytically address TC/TD requirements currently in the Space Radar Capabilities Development Document (CDD).

Space Radar Network Analysis

AbstractID: 421

Mr. Paul A Page	**Mr. Christopher L Rickard**
U.S. Army Space and Missile Defense Command	SAIC
BLDG 5220	6723 Odyssey Drive
Redstone Arsenal,AL 35898	Huntsville,AL 35806
256-955-1618	256-864-8347
DSN: 645-1618	FAX: 256-864-8288
FAX: 256-955-2250	Chris.l.rickard@saic.com
paul.page@smdc.army.mil	

The U.S. Army Space and Missile Defense Future Warfare Center (SMDFWC) conducted a Network Analysis study to support the TRADOC Limited DOTMLPF Assessment (LDA). The results of this analysis were also provided to the Space Radar Integrated Program Office (SR IPO). This study was conducted to determine throughput times for multiple Intelligence, Surveillance, and Reconnaissance (ISR) collection decks and help provide insights to the SR Capability Development Document (CDD). The study supported the TRADOC LDA by assessing the timeliness of both in-theater downlink and reachback (CONUS) cases. Extend was the tool used to execute the study which focused on modeling a wide variety of message types across multiple nodes in order to assess SR communication networks and track individual entities with respective attributes. This briefing will focus on the process of canvassing multiple-agency / multi-discipline SMEs to obtain critical inputs and how that data was utilized to develop a model and associated methodology that can be easily adapted, modified, and enhanced to assess other architecture alternatives and to inject output data into other simulated environments to include force-on-force models and simulations.

IED ATTACKS, CONFLICT ENTERPRISE, AND SUSTAINED CONFLICT

AbstractID: 153

Dr. Milt Pappas Joint IED Defeat Organization 2521 S. Clark St. Arlington,VA 22202 703-601-9645 Milt.Pappas@jieddo.dod.mil	**LTC Robert D McKenzie, USA** Office of the Secretary of Defense, Department of Defense Pentagon 5E368 Arlington,VA 22202 703-697-3133 robert.mckenzie@osd.mil	**Dr. Craig A Schultz** Lawrence Livermore National Laboratory 7000 East Avenue Livermore,CA 94551 925-422-5798 schultz9@llnl.gov

This paper examines the relationship between IED attacks and sustained conflict from an economic perspective. The authors integrate the literatures on economic drivers of conflict with terrorist financing to develop a model of Conflict Enterprise. The authors hypothesize that improvised explosive devices (IEDs) are employed to create and perpetuate permissive environments in which terrorist, criminal, and insurgent elements may engage in a variety of criminal, money-making, or profit-generating, activities. Anecdotal data from Iraq suggest that Conflict Enterprise profits are substantial, with gross revenues exceeding operating expenses by as much as 500%, in the aggregate.

The authors' conclusions are significant, because their analysis implies that Conflict Enterprise profits can be channeled to finance current and future operations globally, furthering terrorist attacks and organized criminal activities around the world. While further empirical research is required to validate the authors' hypothesis, the strategic significance of these analytical conclusions cannot be overstated. A unified USG global strategy against trans-national terrorist networks requires designing measures to dynamically detect, identify, track, attack, disrupt, and dismantle international IED-related production, distribution, and financing networks.

Air and Ground Based Non-Lethal High Power Microwave Weapons in Support of Truck Convoys in the Urban Environment

AbstractID: 466

Dr. Sam H Parry The Boeing Company 5000 E McDowell Road Mesa,AZ 85215-9797 480-891-8926 FAX: 480-891-6542 samuel.parry@boeing.com	**Mr. John C Sachs** The Boeing Company 9725 East Marginal Way South Seattle,WA 98108 206-544-7654 john.c.sachs@boeing.com

Boeing is investigating the potential of new non-lethal weapon technologies for truck convoy escort in the urban environment. The investigation described in this paper utilizes the Baghdad urban area as represented in the Joint Conflict and Tactical Simulation (JCATS). The focus of this investigation is to determine whether non-lethal weapons are appropriate for convoy escort and, if so, what are the attributes and mix that provides adequate protection. Obviously, the advantage of non-lethal weapon alternatives is the reduction/elimination of collateral damage to infrastructure and non-combatants. The weapon concept investigated is a High Powered Microwave (HPM) system (similar to the Active Denial System) mounted on both ground Convoy Protection Platforms (CPPs) and rotorcraft escorts. The ground CPP also carries a 50 Cal MG for use in self-defense mode only. A robust insurgent threat scenario is used, consisting of 7.62mm MGs, 7.62mm Sniper rifles, RPKs, and RPGs located on roof tops, in windows of buildings, and on the ground.

The system attribute variations and tactics investigated include: number of escort rotorcraft, rotorcraft routes (altitude/speed/waypoints), number of ground CPPs, effective range of the ADS, ADS-caused insurgent suppression time, and rotorcraft ballistic protection level.

Measures of Effectiveness (MOEs) included: number of kill shots against trucks, ground CPPs and rotorcraft CPPs by both previously suppressed and unsuppressed insurgents; total number of suppression shots fired by ground CPPs and rotorcraft CPPs; number of insurgents suppressed; number of kills by ground CPP using 50 Cal MG, and the resulting collateral damage/non-enemy personnel killed/wounded.

Overall, the study identified various combinations of system attributes and tactics that resulted in more than 90 percent of the convoy trucks surviving the ambush scenario. Several other quantitative results and insights are provided in the paper.

Establishing an Analytic Framework for Joint Training Assessment

AbstractID: 173

Ms. Annie Patenaude, OSD
OSD Readiness and Training
4000 Defense Pentagon, Rm 1E537
Washington,DC 20301-4000
703-693-4566
annie.patenaude@osd.mil

In December 2007 the Office of the Secretary of Defense completed the second biennial "Block Assessment" of the Training Transformation (T2) program. The Block Assessment was the forcing function for systematic data collection within T2, providing a rich data set to support analysis and assessment against Department of Defense and T2 program objectives. Findings from the assessment are helping leadership evaluate training programs with an eye toward improving performance – as envisioned in the T2 strategy. The briefing will present some of the findings from the 2007 T2 Block Assessment as well as lessons learned regarding metrics development and data collection. The briefing will also describe plans for the future of the assessment, including changes to the metrics and the data collection process to better incorporate existing automated data resources. The T2 Joint Assessment and Enabling Capability (JAEC) office uses a spiral development approach to assessment, expanding the scope with each iteration as the assessment process itself is refined. The findings and lessons presented in the briefing are a sound analytical framework that can inform other projects concerned with program assessment.

Analyzing the Effect of Information Attack on Air & Missile Defense Performance

AbstractID: 290

Mr. Bart Paulhamus	Ms. Amy K Castner
JHU/APL	JHU/APL
11100 Johns Hopkins Rd	11100 Johns Hopkins Rd
Laurel,MD 20723	Laurel,MD 20723
240-228-8514	240-228-5731
barton.paulhamus@jhuapl.edu	amy.castner@jhuapl.edu

With the growing reliance on net-centric warfare, understanding the effect of information operations on the overall mission becomes increasingly important. Information assurance (IA) metrics measure attributes of the underlying information system, such as the availability, confidentiality, and integrity of critical services and data. While informative, there is a disconnect between these metrics and the force-level metrics that measure the success of the mission. Traditional air and missile defense analyses ignore the effects of information attacks and defenses when generating force-level mission metrics (e.g. number of enemy targets killed). There is a demonstrated need to bridge the gap between these types of analysis and better understand the relationship between IA and force-level mission metrics.

In late 2007, JHU/APL initiated a new internal research effort to develop and demonstrate methods for defining the relationships between IA metrics and force-level mission metrics. This presentation analyzes the effect of information attack on air and missile defense by examining modeling and simulation results from a force-level air and missile defense scenario. After a brief description of the systems engineering approach and simulation environments, we compare the performance of a force conducting an air and missile defense mission to the performance of the same force when subjected to a variety of information attacks. The presentation concludes with a discussion of initial progress toward a framework to describe the relationships between IA and force-level metrics.

Military Campaign Analysis Support to a National Intelligence Estimate

AbstractID: 102

Mr. Jeffrey A Paulus, OSD
OSD Analysis and Evaluation (OSD/PA&E) Simulation and Analys
1401 Wilson Blvd, Suite 300
Arlington,VA 22209
703-696-9360x3365
jeffrey.paulus.ctr@osd.mil

In 2007, OSD Program Analysis and Evaluation (OSD/PA&E) Simulation and Analysis Center (SAC) with support from J8 Warfighting Analysis Division conducted campaign-level military combat analysis to support a National Intelligence Council National Intelligence Estimate (NIE) in coordination with the Defense Intelligence Agency. The study examined a variety of excursions on the Major Combat Operations 3 (MCO-3) Analytical Baseline, to include enemy and friendly readiness postures, responses, and capabilities. Principally, analysis was conducted using the Joint Integrated Contingency Model (JICM) and THUNDER simulations. By using a Department of Defense Analytical Baseline as a starting point, the study was able to be completed in less than four months.

The Foundations of Force Structure Analysis: A Preliminary Investigation of Methodological Choices and Consequences

AbstractID: 326

Mr. Mike Payne, USAF	Maj. Eric Murphy, USAF	Capt. Tim Booher, USAF
AF/A9FX	AF/A9FC	AF/A9FM
1777 N. Kent St.	1777 N. Kent St.	1777 N. Kent St.
Arlington,VA 22209	Arlington,VA 22209	Arlington,VA 22209
703-588-8692	703-588-8680	703-588-8289
Michael.Payne@pentagon.af.mil	Eric.Murphy@pentagon.af.mil	Timothy.Booher@pentagon.af.mil

The Air Force analysis community faces a recurring challenge to provide force structure assessments that inform multi-billion dollar acquisition decisions. Moreover, these decisions directly affect our current, and future, national security. With so much at stake, it is important to ensure the soundness of our analytic foundation. In this presentation, we seek expert dialogue on the concept that a force structure, as an ensemble of military systems, is itself a complex system. This implies that an understanding of the interactions between military systems is at least as important to force structure analysis as understanding the systems themselves. We use this insight to construct a simple model of a force structure as a complex system. We then use various analytic methods to explore the model and show how methodological choices affect analytic outcomes. We close by discussing the implications of these effects on force structure assessments and, ultimately, our national security.

Studying Chemical Effects on Infantry Operations Using Agent-based Simulation

AbstractID: 263

Mr. Gerald M Pearman	Dr. Tom Lucas	Mr. Victor Middleton
Air Force Research Lab	Naval Postgraduate School	Air Force Research Lab
Naval Postgraduate School, 1 University Way	1 University Way	Wright Patterson Air Force Base
Monterey ,CA 93940	Monterey,CA 93940	Dayton ,OH 45433
831-869-5125	831-656-3039	937-305-3652
gerald-pearman@us.army.mil	twlucas@nps.edu	middletv@woh.rr.com

MAJ Jon Alt, USA
Training and Doctrine Command Analysis Center - Monterey
Naval Postrgraduate School, 1 University Way
Monterey ,CA 93940
831-656-3732
jkalt@nps.edu

MAJ Rich Geren, USA
Naval Postgraduate School
1 University Way
Monterey,CA 93940
831-656-2786
rlgeren@nps.edu

A research consortium consisting of the Air Force Research Lab-Wright Patterson AFB (research sponsor), the Naval Postgraduate School (NPS) - Monterey, the Army's Training and Doctrine Command Analysis Center (TRAC) – Monterey, and SMEs will use the agent-based simulation Pythagoras to study the effects of chemical weapons on infantry operations. The research team will rapidly prototype an urban chemical environment using Pythagoras and compatible rapid scenario generation (RSG) tools. The scenario threat includes a non-persistent chemical IED against an advancing infantry company. Study areas include risk assessment while operating in a chemical environment, viable techniques for employing unmanned ground vehicles (UGVs) with chemical sensors, and physiological effects of prolonged donning of the protective mask.

An earlier study completed by the consortium concluded that commanders require thorough assessments of kinetic and chemical risks prior to determining MOPP levels or issuing orders to mask. Specifically, the study showed a decrease in chemical casualties when soldiers donned the protective mask, but an increase in overall casualties due to degraded states attributed to the mask. The current project seeks further insights into risk assessment by modeling excursions to commander decisions that vary the degree of chemical risk. The previous study also concluded that employing UGVs equipped with chemical sensors at maximum effective range may not be optimal in urban chemical environments. The current project explores UGV employment options to best support urban operations in a chemical environment. Additionally, the project examines physiological impacts to Soldiers wearing chemical protective gear, to include heat stress and fatigue.

To efficiently explore complex interactions resulting from multiple experimental factors, the study requires innovative experimental designs. For this project, the research team applies emergent analysis techniques advanced by NPS' Simulation Experiments and Efficient Designs (SEED) Center, to include automated design of experiment tools and unique applications of the Latin Hypercube. The team also implements rapid scenario generation tools developed by the consortium to facilitate relatively short development timelines.

This presentation will feature research findings from the chemical study, describe emergent concepts applied to the experimental design, and highlight automated tools that supported rapid model prototyping and experimental design.

Assessment of Army's Need for Theater/Direct Down Link (T/DDL) and Dynamic Re-Tasking (DRT)

AbstractID: 422

Dr. Steve F Pierce
U.S. Army Space and Missile Defense Command
BLDG 5220
Redstone Arsenal,AL 35898
256-955-3570
DSN: 645-3570
FAX: 256-955-2250
Steve.Pierce@smdc.army.mil

Mr. William M Tomlinson
SAIC
6723 Odyssey Drive
Huntsville,AL 35806
256-864-8355
FAX: 256-864-8288
tomlinsonw@saic.com

The U.S. Army Space and Missile Defense Future Warfare Center (SMDFWC) conducted a study to provide inputs to a DA G3/5/7 directed TRADOC Limited DOTMLPF Assessment, which examined Space Radar Direct Receive and Tasking. In this assessment, SMDC provided both qualitative and quantitative analytics to support the Army's Need for Theater/Direct DownLink (T/DDL) and Dynamic Re-Tasking (DRT). The SMDC portion of the study effort examined multiple scenarios and force structures during Major Combat Operations. The assessment focused on Space Radar support to the future ground Warfighter in a 2016-2020 timeframe. This briefing will discuss overall methodology, models/tools used, input data based on SME input/analysis, and top level results which have been used to assist the Army in advocating the potential utility of Space Radar to the ground Warfighter.

A Case Study in Integrated PMESII Modeling and Simulation

AbstractID: 318

Mr. Nicholas J Pioch
BAE Systems Advanced Information Technologies
6 New England Executive Park
Burlington,MA 01803
781-262-4379
FAX: 781-273-9345
nicholas.pioch@baesystems.com

Mr. James Melhuish
BAE Systems Advanced Information Technologies
6 New England Executive Park
Burlington,MA 01803
781-273-3388
FAX: 781-273-9345
james.melhuish@baesystems.com

Mr. Michael F Cook
BAE Systems Advanced Information Technologies
6 New England Executive Park
Burlington,MA 01803
781-262-4375
FAX: 781-273-9345
michael.f.cook@baesystems.com

To foster shared battlespace awareness in Air Operations Centers supporting the Joint Forces Commander and Joint Force Air Component Commander, BAE Systems has developed Commander's Model Integration and Simulation Toolkit (CMIST), an Integrated Development Environment (IDE) for authoring, integration, validation, and debugging of models spanning the Political, Military, Economic, Social, Infrastructure, Information (PMESII) spectrum. CMIST provides a unified graphical user interface for such systems of systems modeling, spanning several disparate modeling paradigms: continuous-time system dynamics, agent-based discrete event simulation, and dynamic Bayesian cause-effect networks. Last year at the MORSS EBO Special Session we presented initial results in CMIST from a notional Political-Military-Economic model of post-war Iraq that integrated these modeling paradigms. This year, we will discuss more recent insights from

subsequent larger-scale PMESII modeling efforts, including applications in course of action (COA) analysis and comparison. We will also describe results and lessons learned from a systematic evaluation of CMIST's modeling capabilities in the context of a challenge problem based on the unclassified Pacifica dataset. Finally, we will discuss potential extensions to CMIST to support more advanced intent reasoning, integrated cyber-modeling and COA analysis, and linkage to external data sources.

Plans for Comparative Investigation of Source Term Estimation Algorithms Using FUSION Field Trial 2007 Data

AbstractID: 206

Dr. Nathan Platt	**Dr. Steve Warner**	**Mr. Steve Nunes**
Institute for Defense Analyses	Institute for Defense Analyses	Institute for Defense Analyses
4850 Mark Center Drive	4850 Mark Center Drive	4850 Mark Center Drive
Alexandria,VA 22311	Alexandria,VA 22311	Alexandria,VA 22311
703-845-2267	703-845-2096	703-845-2795
FAX: 703-845-2255	swarner@ida.org	snunes@ida.org
nplatt@ida.org		

The release of hazardous materials into the atmosphere from an unknown source corresponds to a situation that can be anticipated both on the battlefield of the future and in populated areas where terrorist activities might lead to such a release. Given a warning based on detection of hazardous materials at just a few sensors, it could be useful to rapidly (minutes) provide an estimate of the source location, time of release, and amount of material released. Such an estimate can lead to refined predictions of the hazard area, and can possible support near-term follow-on actions to investigate the cause and nature of the hazardous release.

The Joint Effects Model includes requirements to (1) estimate the source characteristics (source location and magnitude) and (2) refine the dispersion model predictions of downwind hazards. Both of these requirements are currently unmet. Algorithms designed to ingest meteorological observations and information from a relatively small number of samplers are being developed, in large part, under the DTRA-JSTO Rapid Assimilation of Sensor Information Research (RASIR) program. In September 2007, a short-range (~500 m), highly-instrumented test was conducted at the U. S. Army's Dugway Proving Ground. This test, referred to as Fusing Sensor Information from Observing Networks (FUSION) Field Trial 2007 (FFT 07), was designed to collect data to support the further development of prototype algorithms.

This presentation describes how the field trial data collected during FFT 07 is being used for investigation of a several prototype source term estimation algorithms including goals, comparison protocol and design of the test matrix.

Mobility Capability and Requirements Study 2008 (MCRS-08)

AbstractID: 157

LCDR Phillip E Pournelle, USN	**LTC Mark Lukens, USA**
OSD PA&E	OSD PA&E
1800 Defense Pentagon (2D272)	1800 Defense Pentagon (2D272)
Washington,DC 20301-1800	Washington,DC 20301-1800
703-695-0538	703-695-0539
DSN: 225-0538	DSN: 225-0539
FAX: 703-693-5707	FAX: 703-693-5707
Phillip.Pournelle@osd.mil	Mark.Lukens@osd.mil

The Mobility Capability and Requirements Study 2008 (MCRS-08) is the latest in the series of joint mobility studies conducted by the Department of Defense. MCRS will inform the 2009 Quadrennial Defense Review (QDR) by identifying and quantifying the mobility capabilities required to support U.S. strategic objectives into the next decade.

The objectives of the study are to evaluate variations of assets, sources, and destinations; conduct an assessment of the Joint End-to-End Distribution network; identify mobility capability gaps, overlaps, or excesses, and assess the associated risk.

Projection Forces Division (PFD) of OSD PA&E will provide a status report on the preliminary study steps to include a review of past mobility studies and the assessment of their assumptions, stated requirements, questions, and answers. PFD will include the results of a literature review of recent related mobility studies, lessons learned from OEF and OIF and their potential impact on MCRS. PFD will invite questions and comments on the study's analytic approach, tools, and way ahead.

Transitioning Software Technologies from the U.S. Department of Defense to the U.S. Department of Homeland Security

AbstractID: 281

Dr. Gerald M Powell, USA
US Army RDECOM CERDEC Intelligence & Information Warfare Dir
AMSRD-CER-IW-F, McAfee Center
Fort Monmouth,NJ 07703
732-532-2429
DSN: 992
gerald.m.powell@us.army.mil

Efforts are underway to generate increasingly effective, collaborative relationships between the US Department of Defense (DoD) and the Department of Homeland Security for the purpose of enhanced Homeland Defense. Senior Pentagon and U.S. intelligence officials are finalizing the first formal agreements governing how the two communities work together on major acquisitions. Many technologies have been developed in the DoD for military operational environments. There is a tremendous opportunity to capitalize on the investments in many of these technologies by transitioning them to the DHS to support their mission. This presentation will present ideas about how to facilitate this

transition of technologies from DoD to DHS. The focus will primarily be on a strategy that will help identify strong similarities between some key operational problems within DHS and those in DoD for which there is significant understanding and technological assistance in the way of software technologies. In our US Army Science and Technology Program entitled Advanced REsearch Solutions – Fused Intelligence with Speed and Trust (ARES-FIST), we have developed and deployed software technologies for the US Army where we have discovered they have application to DHS as well. We are working to transition some of those into the DHS operational environment and these efforts provide some of the basis for the strategy.

Designing Operational Tools That Foster Advanced Analytic Thinking

AbstractID: 284

Dr. Gerald M Powell, USA
US Army RDECOM CERDEC Intelligence & Information Warfare Dir
AMSRD-CER-IW-F
Fort Monmouth ,NJ 07703
732-532-2429
DSN: 992
gerald.m.powell@us.army.mil

We take the view that central to the production of actionable intelligence from data is having personnel who are trained in sophisticated analytic techniques. In the Army, there is a recognition that a lot more focus and resources could be allocated in the way of training to achieve this goal. Training for the various intelligence (INT) disciplines and for all-source analysis has increasingly focused more on learning how to operate equipment rather than on analytic skills. This is probably a response to the increasing presence of technology in the operational environment and the increasing complexity, generally, of the technologies being fielded. Unfortunately, that technology may not necessarily produce or foster superior intelligence products nor actionable intelligence. We have developed, and in some cases deployed, software tools in the intelligence domain that have been recognized by senior non-commissioned officers and commissioned officers as having operational value, but also as having significant value by way of fostering critical thinking in performing analysis, hypothesis generation, answering intelligence requirements and so on. The designs of the software tools guide users through a process that fosters critical thinking and reduces the likelihood of a number of cognitive biases such as premature closure, representation error, and confirmation bias. This presentation will focus on a number of these tool designs and explain how the tools reduce the likelihood of such biases and foster advanced analytic thinking in users.

Global Sensor Management Decision Support Tool

AbstractID: 98

Maj. David M Pugh, USAF
USSTRATCOM/J881
901 SAC BLVD STE 2E18
OFFUTT AFB,NE 68113-6500
402-232-5384
DSN: 272-5384
FAX: 402-294-8042
david.pugh@stratcom.mil

Capt. Ryan Kappedal, USAF
Air Force Institute of Technology
2950 Hobson Way
Wright-Patterson AFB,OH 45433-7765
937-255-3636
DSN: 785-3636
ryan.kappedal@afit.edu

The rapid evolution of missile defense creates significant challenges in the coordination and prioritization of multi-mission sensors. These sensors must be balanced across the following four mission areas: Missile Defense (MD), Missile Warning (MW), Space Surveillance (SS), and Scientific and Technical Intelligence (S&TI).

In March 2007, the Commander of USSTRATCOM directed the J8 to begin development of the Global Sensor Management Decision Support Tool (GSM DST). The objective is to use GSM DST to provide objective metrics to decision makers regarding mission impacts when making multi-mission sensor decisions.

Computational Models of Group Dynamics for National and International Security Applications

AbstractID: 298

Dr. Michelle D Quirk
Defense Threat Reduction Agency
8725 John Kingman RD Stop 6201
Fort Belvoir,VA 22060-6201
703-767-6388
mihaela.quirk@dtra.mil

Computational Models of Group Dynamics for National and International Security Applications

Michelle Quirk
Defense Threat Reduction Agency and Los Alamos National Laboratory

Here we show a methodology to build a computational framework to capture individual and group behavior, provide an informed analysis and

eliminate individual subjection toward the quantification of nuclear, biological and chemical (NBC) threats. This will entail developing a set of analytic and computational methodologies and a suite of models for the algorithmic representation of social dynamics. The goal is to enable reasoning and policy assistance in the context of simulations of conflict-like situations and hazard prediction modeling. The novelty of this work is a methodology to identify and evaluate “soft metrics” which are quantifiers of non-physical entities, such as the loyalty and willingness to join a terrorist group. We will address the following directions and will show how existing research results can be used immediately in a synergistic manner:

1) Mathematical models of strategic interactions, developed in a quantitative theory of social dynamics.
2) Models for soft metrics that are quantified via a multivalued logic approach. In a game-theoretical context, soft metrics reflect the disparities among utilities, thus providing more realistic models of conflict situations and ultimately a more accurate threat assessment.
3) Formalism for scenario specifications for computational implementation.
4) Validation and technological challenges. We show why/how validation can/must permeate our work.
5) Build a knowledge base and enhance existing models.

This methodology for developing realistic models of strategic interactions in a multi-agent environment, contributes to improving the planning and response capabilities associated with NBC threats. The implementation of the challenges discussed here renders a decision support system with predictive capabilities, relying on a comprehensive knowledge base and a reliable set of production and inference rules. This research project will be attractive for existing and future government programs in threat reduction initiated by DOE, DOD, DTRA, and DHS.

Soft metrics for decision analysis under uncertainty

AbstractID: 304

Dr. Michelle D Quirk
Defense Threat Reduction Agency
8725 John Kingman RD Stop 6201
Fort Belvoir,VA 22060-6201
703-767-6388
mihaela.quirk@dtra.mil

Soft metrics for decision analysis under uncertainty

Michelle Quirk
Defense Threat Reduction Agency

Modern decision making (DM) challenges the human capacity to reason in an environment of uncertainty, imprecision, and incompleteness of information. Atop the uncertainty, ranking in the presence of multiple criteria, multiple agents, and heterogeneous sources of information is often the main task to accomplish.

This talk gives the basics of a computational framework where computing based on natural language (NL) addresses the lack of rigorous decision criteria and multiple aspects of uncertainty in a complex systems framework. The theory behind this new computational paradigm relies on fuzzy logic which allows the thought flexibility to be embedded into a mathematical apparatus. Fuzzy sets describe a possibility distribution that gives a possibility measure.

Possibility theory overcomes some of the restrictions and insufficiencies of probability theory, in a complementary and not competitive manner. We give a brief parallel between between the measures of probability and possibility (as mathematical entities). The soft metrics - introduced via possibility measure - are attributes of decision criteria that cannot be expressed numerically. These metrics are at the core of a computational engine that is perception-based with computational “atoms” expressed in NL. The framework is built such that a continuous validation of the perception-based operations is possible and a thorough sensitivity analysis can be performed.
A relevant set of soft metrics addresses the principle of incompatibility, since it provides a balance
between the reasonable depth of an analysis and the complexity of the problem. Hence, the final results of an analysis can be presented to the policy makers in simple formats.

The soft metric approach as a basis for NL-based computing contributes to fast analyses and an efficient use of human resources in contemporary DM such as: the Global Strike (target pairing), intelligence data analysis, risk analysis, threat assessment, strategic interactions, conflict analysis, and strategic deterrence.

The engineering of information systems: the system failure approach

AbstractID: 307

Dr. Michelle D Quirk
Defense Threat Reduction Agency
8725 John Kingman RD Stop 6201
Fort Belvoir,VA 22060-6201
703-767-6388
mihaela.quirk@dtra.mil

Acknowledgement: the author thanks Mr. Dennis Yatras and LTC Benjamin Bigelow for sharing their knowledge and experience during the building of the P-ISR requirement database.

This talk introduces the reader with basic building blocks in the engineering of complex information systems. Considerations on DoD P-ISR

system are presented, substantiated with references from the open literature.

We begin with a historical view of basic engineering concepts applied to: 1) the bridges of ancient times, 2) the building of a sky-rise, 3) computers and the building of a nuclear plant, and 4) computers for information systems.

A brief on expert systems is given, followed by considerations on the engineering of information systems. Expert systems cannot substitute the human thinking. Yet, provided with a selected set of rules, expert system may substitute a limited path of the human reasoning. The success relies on the knowledge engineer; we show the need for a sustained education and interdisciplinary training activity across DoD.

The Persistent ISR vision comprises a vast information systems with unique sets
of requirements stemming form the nature of the environment in which the system must operate.
Thus, aside from a need to process data in real-time or near real-time, the distribution
of information to a list of dynamically changing subscribers, layered with information security
mechanisms, this system is one of the most challenging DoD systems, given its demanded reliability. We discuss the design of P-ISR and the NECS vision.

Next we take a system failure approach and show lessons learned with examples of costly efforts that were not brought to fruition. This approach identifies first the possible failure points and ensures a robust design by avoiding the risky design and implementation approaches. .

This talk gives a few golden rules for a successful engineering of information systems. The most restrictive one pertains to the specialization of personnel. Highly trained knowledge engineers, with a strong technical (engineering, mathematics, physics, software engineering) are the only guarantee to a successful design, a robust system, delivered in time at the required reliability and performance level.

A ranking methodology for future investments in active interrogation technologies

AbstractID: 415

Dr. Mihaela D Quirk	**Mr. Lyndon Wrighten**
Defense Threat Reduction Agency	Defense Threat Reduction Agency
8725 John Kingman Road, MSC 6201	8725 John Kingman Road, MSC 6201
Fort Belvoir,VA 22060	Fort Belvoir,VA 22060
703-767-6388	703-767-3074
mihaela.quirk@dtra.mil	lyndon.wrighten@dtra.mil

Active interrogation technologies (AIT) are based on the use of an external source to stimulate measurable radiation signals that are not usually present or do not have sufficient magnitude to be detectable. X-rays are an example of an AIT. The use of penetrating nuclear radiation, such as neutrons or photons, as a probe to stimulate a unique radiation signature from fissionable is an effective way to detect special nuclear materials (SNM).

In this talk we show how to rank these novel technologies for future investment strategies. The ranking of AIT is a typical modern decision analysis problem characterized by:
1.soft, heterogeneous criteria,
2.multiple decision agents (or interested parties) that may have conflicting interests
3.severe uncertainty
4.perception-based components.

The attributes of this decision problem are of four major classes: the decision criteria, the decision agents, the identification of sources of uncertainty and a quantification of the overall uncertainty, based on individual measures, and the perceptions on the merits of each technology depending on its availability and specific properties The variety of the parameters involved makes a straightforward ranking impossible

We show a decision analysis framework applied to AIT ranking. The mathematical support is based on a paradigm that complements the classical probabilities with a non-probabilistic set of measures and a mixed set of operations between these measures. Non-probabilistic measures are used to mimic better the human decision path, by weighing alternatives, yet supported by a rigorous mathematical operations set. We also show how validation of this method permeates the ranking process, from the incipient stage.

This work is an essential component of DTRA Campaign X: Defeat the Threat of Lost or Stolen (Loose) Nuclear Weapons

A computational framework for deterrence assessment analyses

AbstractID: 465

Dr. Michelle D Quirk
Defense Threat Reduction Agency
87325 John Kingman Rd
Fort Belvoir,VA 22060
703-767-6388
mihaela.quirk@dtra.mil

We present methods of decision analysis with soft criteria that can be used to construct a computational framework to support the deterrence assessment analyses. The aim of this work is the derivation of the modelling techniques and algorithms that will complement the human reasoning towards real-time decision making.

We show how to embed results from disciplines such as sociology, political science, anthropology, mathematics, and computer science – into a computational framework. Moreover, a unified system of relevant metrics will lead to the integration of decision techniques pertinent to any of the deterrence aspects. Soft metrics are the foundation of a decision calculus paradigm that will enable mathematical operations across a variety of deterrence attributes. These metrics:
* are based on probabilistic and non-probabilistic calculus and
* have a double role: 1) they contribute to inference rules, through calculus across heterogeneous criteria and 2) express utility functions in a game-theoretical approach so that the assymetry aspects can be described reliably.

This novel approach in decision analysis renders a decision support system with inference capabilities that will respond to the following major requirements:
1) repeatability of analyses
2) a retrievable way to catalogue analyses
3) identification of common decision elements in analyses that result in an automation of the analyses and further captures the dynamic aspect of the deterrence assessment problems.

For the validation task we will engage decision agents such as subject matter experts and policy makers. We will show how validation will be embedded in the work from incipient stages such that our analyses stand scrutiny.

Condition Based Maintenance

AbstractID: 53

Mr. Eric Rabeno
AMSAA
392 Hopkins Road Bldg 392 (AMSRD-AMS-LA)
Aberdeen Proving Ground,MD 21005
410-278-3051
eric.l.rabeno@us.army.mil

Condition based maintenance (CBM) is a plan of maintenance for a system based upon the actual condition of the system as enabled by the application of usage, diagnostic and prognostic processes executed on a Health and Usage Monitoring System (HUMS). Usage refers to the manner in which the system is employed and gives indications of how and why things are broken or breaking. Usage characteristics include hours running, miles driven, time at idle, fuel consumed, et cetera collected from on board vehicle sensors. Diagnostics is based on the symptoms or indicators of problems and uses methods to find what is broken and breaking in a system. The ultimate goal of HUMS is to leverage the knowledge base gained with usage and diagnostics in developing prognostic algorithms that will enable the prediction of system failures and, therefore, required system maintenance actions before failures occur. This will ultimately improve efficiency, reduce logistics costs, and improve driver and crew safety.

The US Army Materiel Systems Analysis Activity (AMSAA) is in the process of developing and implementing a CBM system for ground vehicles. This development process has included the development of a robust military-grade HUMS in conjunction with the Aberdeen Test Center and the development of data collection, reduction, analysis, and reporting processes. AMSAA is currently verifying and validating the system hardware and processes with implementations in military test and training environments and finally with the in-theater fielding of the system. Integration with the Army's logistical architecture will be the final development step.

Advanced Collaborative System Optimization Modeler (ACSOM)

AbstractID: 11

Mr. Stephen H Rapp
General Dynamics Land Systems
38500 Mound Road
Sterling Heights,MI 48310
586-825-4963
FAX: 586-825-5075
rapps@gdls.com

Mr. Douglas R Rogers
General Dynamics Land Systems
38500 Mound Road
Sterling Heights,MI 48310
586-825-5264
FAX: 586-825-5075
rogersd@gdls.com

Mr. Gregory D Hartman
General Dynamics Land Systems
38500 Mound Road
Sterling Heights,MI 48310
586-825-5454
FAX: 586-825-5075
hartmang@gdls.com

The Advanced Collaborative System Optimization Modeler (ACSOM):

1) Creates A Set of Balanced, Feasible, Non-dominated, Whole-system Design Solutions
2) Displays model information so that System Performance and Allocation Thresholds from DoD Requirement Documents (MNS/ORD/CDD) can be assessed
3) All done within minutes by using a non-specialized PC that
a) Considers Full Spectrum of Subsystem Options
b) Prevents Infeasible Combinations of Subsystems
c) Finds a set of Balanced Solutions, Performance versus Burdens
4) Also provides a direct solve extension to the combinatorial model that finds a single vehicle alternative by using multi-objective optimization balancing all criteria

ACSOM is a COTS-based system using a SQL Server Desktop front end to provide a database with GUI for the Decision Analysts. The core of ACSOM uses the MPL Algebraic Modeler and the CPLEX Solver to generate solutions. The SQL Server Desktop also creates on the back end a sharable Excel Analysis Tool for customers, managers and engineers to manipulate the results and conduct "what if" analysis.
ACSOM has provided dramatic results in the Abrams, Stryker and Future Combat Systems programs and is the premier Whole System

Trade Study Tool for General Dynamics Land Systems.

Optimized Routing of Unmanned Aerial Systems for the Interdiction of Improvised Explosive Devices

AbstractID: 176

Maj Daniel N Reber, USMC
Marine Corps Combat Develepment Command
3300 Russell Road
Quantico,VA 22134
703-432-8020
DSN: 278-8020
daniel.n.reber@usmc.mil

Dr. Johannes O Royset
Naval Postgraduate School
1 University Drive
Monterey,CA 93943
831-656-2578
DSN: 756-2578
FAX: 831-656-2595
joroyset@nps.edu

As of January 2008, improvised explosive devices (IED) account for 43% of U.S. casualties in Iraq – the largest single cause of death. One reason for their high rate of effectiveness is that they are extremely difficult to detect. This research develops a tool for selecting routes that will best employ unmanned aerial systems (UAS) for the purpose of detecting IED or related activity. We refer to this tool as IED Search Optimization Model (ISOM). ISOM – which uses prediction model results as an underpinning – accounts for factors such as winds, sensor sweep-width, and aircraft de-confliction. We formulate the problem as an Integer Program and optimally solve it to select the best routes. Initial evaluation of ISOM through field experiments with actual UAS suggest that the tool produces realistic routes which can be flown in the expected amount of time. Furthermore, these routes result in a 42% increase in the likelihood of achieving a detection opportunity over searching nodes in a random manner. ISOM could be implemented as a “reach-back” capability with an analyst providing daily routes for tactical operators.

Mobility Capbilities and Requirements Study

AbstractID: 218

Ms. Karyl M Reckamp
USTRANSCOM JDPAC
709 Ward Dr. BLDG 1990
Scott AFB,IL 62225
618-220-5117
DSN: 770-5117
FAX: (618)220-5125
karyl.reckamp@ustranscom.mil

USTRANSCOM will discuss our recommendation that the next mobility study expand to capture capabilities and requirements. Our goal is to complete a study which determines the mix of capabilities and requirements (deployment, employment, sustainment, and retrograde) to support the warfighter with the end-to-end Joint Deployment and Distribution Enterprise. Alternatives should include variations in air mobility, sealift, ashore and afloat pre-positioning, infrastructure, land transportation, distribution strategy sources, forward basing, and sea basing. Challenges are completion of scenarios and the Integrated Security Posture (ISP) to determine JDDE gaps, overlaps, or excesses. In the end, the study must produce actionable programmatic recommendations to the current mobility program required to meet Combatant Commander force projection and distribution requirements with acceptable risk. Presentation will include comparative analysis, changes since MCS, and other COCOM/Service MCRS mobility analysis goals.

Panel Discussion of Current Force RESET Issues Facing our Military Today and in the Future

AbstractID: 517

Mr. Norman Reitter
CTC
100 CTC Drive
Johnstown,PA 15904
814-269-2516
reittern@ctc.com

Maj Matt Reuter, USMC
Logistics Studies and Analysis Office, HQMC I&L
2 Navy Annex
Washington,DC 22142
703-695-8800
matthew.reuter@usmc.mil

Mr. Joe Mata,
HQDA DCS G-8

COL Dan Williams, USA
OSD-ATL (tentative)

Force RESET is a hot topic for today's military. Forward operations in Afghanistan, Iraq, Africa, and other global locations has stretched our military forces to the point where we must use the most efficiency in resourcing to meet Force RESET timelines that meet a required level of operational readiness. Meeting Force RESET timelines is challenging now and will be for years to come as we continue to support global operational requirements. This panel discussion includes representatives from the Office of the Secretary of Defense, the Army, and the U.S. Marine Corps Headquarters Staffs that will present Force RESET issues from their perspective and provide answers to questions from audience participants. This is a great opportunity for the military operations research community to hear about how we can support these critical issues in maintaining a strong forward military operational readiness posture.

Reliability Analysis & Modeling of the USMC Med. Tactical Wheeled Vehicle in OIF

AbstractID: 34

Maj Matthew B Reuter, USMC
Installations and Logistics Department, Headquarters U. S. M
2 Navy Annex
Washington,DC 20380
703-695-8800
DSN: 225-8800
matthew.reuter@usmc.mil

This thesis describes an analysis of the reliability of the Medium Tactical Vehicle Replacement (MTVR) cargo variant in Operation Iraqi Freedom (OIF), from March 1, 2004 to March 31, 2007. More than 870 MTVRs were fielded by the Marine Corps for OIF during the period of study, of which 456 are analyzed. Analysis and modeling of this repairable system's failure modes are conducted at the MTVR variant, major unit, armored status, and subsystem levels to develop an understanding of the vehicle's usage and performance in field conditions. Reliability is measured by the frequency of occurrence of unscheduled maintenance events, with the number of days that a vehicle is not available due to these events ("deadlined days") used as a measure of severity. The challenges of using field maintenance and supply data are overcome by using various methods, including data verification, failure event aggregation, and odometer reading imputation. Nonparametric and parametric methods are utilized, with system and subsystem failure mode recurrence data, to measure reliability throughout the period of observation and amidst the installation of system modifying vehicle armor kits. Recurrence data, that are found to match a homogeneous Poisson process model, are used to determine common reliability parameters. The analysis concludes with a Poisson regression model that predicts failure rate based upon MTVR variant, unit, and armored status.

Measuring Availability Beyond 'Mission Capable Rate'

AbstractID: 15

Dr. Roy E Rice
Teledyne Brown Engineering
300 Sparkman Dr.
Huntsville,AZ 35805
256-726-2038
FAX: 256-726-3434
roy.rice@tbe.com

In March of 2007, the Deputy Under Secretary of Defense for Logistics and Materiel Readiness issued a memorandum on the subject of Life Cycle Sustainment Outcome Metrics. In that memorandum, they detail Supportability Measures that all ACAT I programs must track and report at every major milestone. The four Material Readiness outcome goals that they require are (1) Material Availability, (2) Material Reliability, (3) Ownership Cost, and (4) Mean Downtime. There has been concerted effort to include these metrics in Performance Based Agreements (PBA). This presentation discusses some inherent deficiencies with the Material Availability measure of (Uptime/(Uptime + Downtime)). Each of the Services usually refer to this as Mission Capable (MC) Rate. The presentation shows the mathematical derivations of two other Availability Metrics that could be used as adjunct or replacement measures for Material Availability. Linkages between the measures are also delineated.

Analyzing Weapons Cache Finds in Iraq in Order to Improve Weapons Cache Search and Targeting Strategies

AbstractID: 70

Capt Earl Richardson, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
earl.richardson@usmc.mil

Capt Joseph Mlakar, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
joseph.mlakar@usmc.mil

Capt Tom Tsoutis, USMC
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8183
DSN: 378-8183
anastasios.tsoutis@usmc.mil

Mr. Douglas Hoffman
Marine Corps Operations Analysis Division
3300 Russell Road
Quantico,VA 22134
703-432-8181
DSN: 378-8181
douglas.hoffman@usmc.mil

Insurgents in Iraq use a network of weapons caches to supply the equipment needed to carry out attacks against coalition forces. Finding and clearing weapons caches in Iraq is of great value to coalition forces: it interdicts the enemy’s supply chain and prevents enemy attacks. Because of this, coalition force units in Iraq regularly schedule “cache sweep” missions to attempt to locate weapons caches. They also allocate surveillance resources to monitor activity near suspected weapons cache sites.

Searching for weapons caches in Iraq is a complex problem. Coalition force units operating in Iraq have scarce resources and a large land area to search. Thus, they need to use effective search strategies that give them the highest potential for finding weapons caches. In this research, we analyze data on known weapons cache locations and insurgent attacks in order to identify trends and patterns that describe the enemy’s employment of weapons caches. For example, we investigate (1) the spatial correlation between weapons cache locations and attack locations and (2) when and how the enemy is known to re-use prior weapons cache sites that have been cleared by coalition forces. We

demonstrate through case studies how the insight gained from our analysis has been employed in Iraq to improve search and/or targeting strategies for weapons caches.

Sensor Performance Optimization Tool

AbstractID: 82

Mr. James S Richardson
Systems Planning and Analysis
2001 N. Beauregard St
Alexandria,VA 22311
703-399-7218
jrichardson@spa.com

The Sensor Performance Optimization Tool, SPOT, is a M&S (Modeling and Simulation) based operation research software develop by System Planning and Analysis for the US Coast Guard R&D Center that visualizes and assesses the impacts of sensor settings and search tactics on area coverage effectiveness.

SPOT can be used by government agencies, defense agencies and civil support groups by aiding helicopter pilots, helicopter SAR (search and rescue) coordinators, and other air operation planners in developing search patterns that maximize the probability of detecting targets based on the sensor system being used, how the sensor is used, the operational environment, time of day, target size, and helicopter movement parameters.
In addition to a visual representation, SPOT allows users to input ranges for the sensor and helicopter movement parameters as well as variables describing how the state space of all possible combinations should be searched. With these characteristics SPOT searches the state space using full enumeration or simulating annealing and determines the sensor and helicopter parameters that optimize the objective function that describes the probability of detection.

As SPOT steps through the state space a complete collection of the results is kept and can be used in support of analytic training so that pilots and analysts can actually see the difference in effectiveness of different parameter combination. Furthermore, once the optimal pattern has been determined using SPOT analyst can use the tool to run Monte Carlo simulations to assess the effectiveness of the search pattern on actual targets.
A brief at MORS would include a demonstration, discussion about the pros and cons of using simulating annealing versus full enumeration in this type of experiment, and a short demonstration of analysis that can be conducted with the tool.

Use of Confidence Intervals for Comparing Force Package Capabilities

AbstractID: 83

Mr. James S Richardson
Systems Planning and Analysis
2001 N. Beauregard St
Alexandria,VA 22311
703-399-7218
jrichardson@spa.com

Confidence intervals and statistical rigor are very important in comparing and understanding force package performance. A force package is a combination of variety of assets that work together to achieve a common goal such as area surveillance, counter drug interdiction, or anti-immigrant operations. Force packages could include a surface ship with a helicopter, a surface ship with MPA, or VUAVs and MPA, for example. Each member of a force package has their own characteristics such as speed, endurance, and detection abilities which drive the overall capability of the force package to perform a desired mission.

Comparing force package performance is a very common practice in acquisitions and when performing analysis of alternatives. In order to properly compare two force packages, great analytic rigor must done to develop a model to properly simulate force package performance data and when analyzing the data that is produced by the model.

Fortunately, by simulating a “threat vessel” transiting through a virtual AOR that is being patrolled by a specific force package we are able to represent a force package capability as series of Bernoulli trails. The threat vessels will either be able to transit through the force package system successfully or they will not be able to transit the through successfully. Once we have set our model up in this manner we can view our force package system as a population proportion and can compare force package capabilities using statistically rigorous analytic techniques such as confidence intervals and hypothesis testing.

A brief at 76th MORS Conference would include a discussion about why confidence intervals are important, how they are applied, how they should and should not be interpreted, and how sample size can affect analysis and the types of confidence intervals used.

AbstractID: 84

Mrs. Karen A Richey
Government Accountability Office
441 G. Street NW
Washington,DC 20548
202-512-4784
FAX: 202-512-5939
richeyk@gao.gov

Ms. Carol Cha
Government Accountability Office
441G. Street NW
Washington,DC 20548
202-512-4456
chac@gao.gov

The U.S. Government Accountability Office (GAO) is responsible for, among other things, assisting Congress in its oversight of the federal government, including agencies' stewardship of public funds. Legislators, government officials, and the public want to know whether government programs are achieving their goals and what their costs are. The capability to generate reliable program cost estimates is a critical function necessary to effectively use public funds and to support the Office of Management and Budget's (OMB) capital programming process. Without it, agencies are at risk of experiencing cost overruns, missed deadlines, and performance shortfalls—all of which are recurring problems that our program assessments too often reveal.

Our Cost Assessment Guide was developed in order to establish a consistent methodology based on best practices to be used across the federal government for the development and management of its program cost estimates. In particular, it provides a detailed link between cost estimating and earned value management (EVM)—which is especially critical for setting realistic program baselines and managing risk. By design, managers and auditors alike should find this Guide to be a useful manual as they assess (1) the credibility of a program's cost estimate for budget and decision-making purposes, and (2) the program's status using EVM.

In this presentation, we will discuss the content of the Guide and highlight case studies from previous audits which illustrate the best practices being discussed. In addition, we will provide examples of recent GAO audits where the Guide was piloted as an audit tool.

Strategic Impacts of the IED

AbstractID: 484

Dr. Steve Riese
JHU/APL
901 SAC Blvd
Offutt AFB,NE 68113
402-294-6124
DSN: 271
FAX: 402-294-8042
stephen.riese@jhuapl.edu

The improvised explosive device (IED) is our enemy's weapon of choice and has become a weapon of strategic influence that produces effects disproportionate to the immediate tactical impact. This presentation seeks to identify the link between tactical action and strategic outcome. Several historical cases are briefly reviewed and a candidate problem framework is developed. Furthermore, this presentation serves to introduce the topic for the other two presentations in the session.

A Report on the Sponsor Focused Colloquium on Operations Research Methods for IED Defeat, 13-15 November 2007

AbstractID: 485

Dr. Steve Riese
JHU/APL
901 SAC Blvd Suite 2E13
Offutt AFB,NE 68113
402-294-6124
DSN: 271
FAX: 402-294-8042
stephen.riese@jhuapl.edu

Many in our community believe that operational analysis has not yet realized its full potential in the complex and dynamic IED problem set. In November 2007, a combined MORS and JIEDDO effort provided a venue to meet this challenge of advancing the field of analytics in the IED arena. This Sponsor-Focused Colloquium was a pioneering endeavor for MORS. In relatively short order, the joint team organized an effective meeting that tackled specific and significant operational problems – exactly the type of challenging national security issues that MORS is intended to address. This presentation will outline the goals and objectives of the workshop, describe the outcome in terms of its recommendations, and report on what has been done with those recommendations since the workshop.

LCS Sea Frame and SUW Mission Package - Weapons Effectiveness Study

AbstractID: 402

Mr. Richard C Rigazio, USN
Navy Warfare Development Command
686 Cushing Road
Newport,RI 02841
401-841-3104
DSN: 948-3104
FAX: 401-841-7022
rigazior@nwdc.navy.mil

The LCS Surface Warfare (SUW) mission package (57mm, 30mm or 25mm, NLOS-LS, MH-60R, Hellfire) was assessed against groups of small boats and reported to LCS Oversight Board (OSB) in Feb 2007. This study builds from this previous work, using similar tactical situations to assess LCS SUW integrated performance versus swarming boats. Tactical situations assess LCS in scenarios in which it can and cannot control threat closure rates. Comparisons are drawn between the LCS equipped with 30mm versus 25mm minor-caliber aft guns. The study incorporates more detailed and updated gun characterization input data, including updates to error budgets, firing times, and lethality data. These address issues apparent in previous work. NWDC obtained this data from PEO IWS-3, NAVSURFWARCENDIV Dahlgren VA, and NAVSURFWARCENDIV Port Hueneme Div Det Louisville KY. Metrics used address weapons effectiveness (hits and kills per salvo fired, accuracy versus range, and kills prior to boats reaching effective weapons release ranges). Comparisons to requirements from the LCS Capabilities Description Document are drawn. This report was accepted by COMNAVSURFOR and the study was closed our based on its results and recommendations.

Submarine Air Asset Maritime Interdiction Integration

AbstractID: 520

Mr. Joseph A Root
USPACOM J81 / Alion Science and Technology
HQ USPACOM, J81 Innovation and Experimentation
CAMP H. M. SMITH,HI 96861
808-477-8258
FAX: 808-477-7667
joseph.a.root.ctr@pacom.mil

Mr. Tony Snodgrass
Mercury Solutions, Inc.
91-1046 Kaihanupa St.
Ewa Beach,HI 96706
808-341-3236
FAX: 808-477-7667
tony.snodgrass@mercurysolutions.com

During Exercise Northern Edge '08, U.S. Pacific Command (USPACOM) and the Naval Undersea Warfare Center (NUWC) have partnered to test and evaluate the potential of submarine mounted Link-16. Enabling submarines with Link-16 has become a high Navy priority in recent years, and this effort is part of an ongoing drive to make most, if not all, submarines Link-16 capable. The latest effort by the Navy involves integrating submarines into the Link-16 Global Command and Control System – Maritime (GCCS-M) architecture using Extremely High Frequency (EHF) Automated Digital Network System (ADNS) as the primary communications path. NUWC will conduct system maintenance and testing, while USPACOM personnel will focus on operational utility and performance. The utility and performance will evaluate, specifically, the use of submarine-produced Link-16 data to conduct Over-the-Horizon targeting of hostile surface assets for the Navy's Standoff Land Attack Missile – Expanded Response (SLAM-ER). Live submarine, surface, and air assets will conduct experimentation during two Fleet Training Exercises. Experimentation will explore the tactical and operational compatibility of submarines and air assets, and will determine the operational potential of submarine OTH targeting for USPACOM war plans. Experiment planning, design, execution, and results will be presented at the UNCLASSIFIED level, and all supporting products will be UNCLASSIFIED.

Pre-Milestone-A Cost Estimating: Progress, Challenges, and Change

AbstractID: 39

Ms. Martha "Marti" A Roper, USA
ASA-FM, ODASA-CE
1421 Jefferson Davis Highway, Suite 9005
Arlington,VA 22202
703-601-4140
DSN: 329-4140
FAX: 703-601-4431
martha.roper@hqda.army.mil

Pre-Milestone-A Cost Estimating: It's a relatively new concept in defense analysis, but one very familiar to the early cost analysis research team at the Office of the Deputy Assistant Secretary of the Army for Cost and Economics (ODASA-CE). With over eighteen months logged in parallel research and application efforts, the time investment continues to produce dividends of both progress and salient lessons learned. More than ever, it is clear that early acquisition investment decisions must be cost-informed, and the demand for this early cost information is growing.

There are three major elements that enable Pre-Milestone-A cost estimating. The first is an analysis framework that can make use of qualitative capability data (along with any physical, technical, and performance data available at that time) to produce a cost estimate. The second is a cumulative high-level cost data source that links systems to their capability sets. The third is an analysis culture with the policy, procedure, and willingness to develop and/or accept cost estimates that are less precise than those developed at Milestone B or Milestone C.

The first element, the capability-based analysis framework, has been developed and is being continuously refined and applied under our research efforts. The second element, the high-level capability mapping coupled to cost data, has been developed, populated, and is growing as more data becomes available. The third element, however, is one that involves more than mere research and data collection. It requires large-scale, department-wide culture change within and around the analysis community. It is clear that, without this third element, an ample

supply of elements one and two alone will not enable capability-based, early cost estimating. This paper expands on lessons learned, and explores analytical and culture barriers to effective Pre-Milestone-A analysis.

Volume Fires

AbstractID: 534

LtCol Stanley W Salamon, USMC
OPNAV Assessments Branch, N81T
2000 Navy Pentagon, Room BE922
Washington,DC 20350-2000
703-695-4857
DSN: 225-4857
FAX: 703-614-0621
stanley.salamon@navy.mil

Since 1992, the Navy and Marine Corps have been defining requirements for Naval Surface Fire Support (NSFS) that will meet the needs of developing operational concepts. Modern vertical lift capabilities and concepts of Distributed Operations have stressed the Navy's ability to provide surface fires in support of ground operations beyond the range of current Naval Surface Fires Systems. The Joint Fires in Support of Expeditionary Operations in the Littorals, Initial Capabilities Document (November 2005) established four gaps in fire support. Gap 4 – the ability to provide sufficient volume of fires remained to be quantified and has been a source of debate between the naval services, and concern from Congress (see GAO-05-39R "Options for NSFS"). The Volume of Fires study completed by N81T, April 2008, utilized ITEM to determine the availability of volume fires to USMC forces, and the relative impact of future programmatic investments in NSFS systems when used in a volume fires role. The baseline run utilized Marine Air Ground Task Force (MAGTF) organic fires in a volume fires role. Subsequent runs added the Extended Range Munition (ERM) which is being developed for the DDG-51 Flight IIA platforms, and Long Range Land Attack Projectile (LRLAP) which is being developed for DDG-1000.

Capabilities Needs Analysis: Decision Analysis for Building the Future Force

AbstractID: 265

Mr. Ronald F Salyer, USA
Army Capabilities Integration Center
20 Whistler Lane (ATTN: ATFC-RC)
Fort Monroe,VA 23188
757-788-6241
DSN: 680-6241
FAX: 757-788-4469
ronald.salyer@us.army.mil

LTC Sean Deller, USA
Army Capabilities Integration Center
20 Whistler Lane (ATTN: ATFC-RC)
Fort Monroe,VA 23188
757-788-4324
DSN: 680-4324
sean.deller@us.army.mil

MAJ Aaron Swain, USA
Army Capabilities Integration Center
20 Whistler Lane (ATTN: ATFC-RC)
Fort Monroe,VA 23188
757-788-6244
aaron.swain@us.army.mil

The Army annually conducts the Capabilities Needs Analysis (CNA), a macro-level determination and prioritization of operational capability needs to support Joint Warfighting requirements embodied in Future Warfighting concepts to assist in prioritizing limited resources for system acquisition and Program Objective Memorandum development. CNA applies a modified Delphi process implemented in an object based World Wide Web application to collect data and conduct assessments. A broad application of utility theory is used to resolve conflicting multiple attribute objectives to achieve an ordering of Future capabilities and determined capability gaps. The CNA uses approved Joint and Army concepts as a basis to: identify and order future force required capabilities; identify and order Doctrine, Organization, Training, Materiel, Leader Development, Personnel and Facilities (DOTMPLF) solutions essential to support Army Joint Land operations embodied by the required capabilities; and identify unsupported required capabilities as capability gaps and sufficiency gaps and resulting development priorities across Joint Capability Areas. The results of the assessments and prioritizations are validated by a Warfighting Council (WFC) of experts, a Council of Colonels (CoC) and a General Officer Steering Committee (GOSC). Results of the analysis have been well received as a robust analytic way to inform decision makers involved in system acquisition and POM development. Additionally, the results are being used to prioritize resources associated with Capabilities Based Analysis and the Joint Capabilities Integration System developments, Army experimentation, and Science and Technology investment.

Integration of Iraqi and Coalition Reports

AbstractID: 133

Mr. Scott Sanborn, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5079
DSN: 656-5079
FAX: 703-806-5726
scott.e.sanborn@us.army.mil

LTC Kirk C Benson, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5527
DSN: 656-5527
FAX: 703-806-5726
kirk-benson@us.army.mil

Mr. Kyle Minor, USA
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060
703-806-5638
DSN: 656-5638
FAX: 703-806-5726
kyle.minor@us.army.mil

Mr. John Warren, USA
Center for Army Analysis
6001 Goethals Road

Fort Belvoir,VA 22060
703-806-5325
DSN: 656-5325
FAX: 703-806-5726
john.w.warren@us.army.mil

The Center for Army Analysis provides two analysts, on a rotational basis, to Multi-National Corps-Iraq. One of the functions of these forward-deployed analysts is to maintain a database of activity taking place on the battlefield. Events are reported by Coalition and Iraqi units or organizations; the reporting flows for these types of reports are different, but both are posted to the Combined Information Data Network Exchange. Coalition reported events are generally complete, accurate, and contain few duplicate entries. Iraqi reported events have historically not gone through a vigorous review process, resulting in report inaccuracies, incompleteness, and duplication. The purpose of this effort is to conduct a review of historical Coalition and Iraqi reported events, produce an accurate and cleansed data set of Iraqi reports, provide forward-deployed analysts with potential duplicate Coalition reports (for review in-theater), and develop an automated solution (for use in-theater) to assist with future data de-duplication efforts. This effort will enable a more complete picture of reportable events taking place within the Iraq Theater of Operations and will lead to better informed decisions regarding operations and resource allocation.

Estimating U.S. Army small unit pre-deployment training development requirements

AbstractID: 253

Mr. William R Sanders, USA
U.S. Army Research Institute
121 Morande Street
Fort Knox,KY 40121-4141
502-624-2613
DSN: 464-2613
FAX: 502-624-8113
william.r.sanders@us.army.mil

Small unit leaders are currently faced with a great challenge to quickly develop, deliver, and assess pre-deployment training to match the rapidly changing threat, and specific Area of Operations (AO). The U.S. Army Research Institute (ARI) has initiated a program of research to develop training tools and performance measures to support the rapid development of effective and efficient pre-deployment training that can be implemented by small unit leaders (Company Commander, Platoon Leader). This presentation describes the analytical approach and conceptual framework employed by ARI to develop preliminary estimates of the types of training that small unit leaders and the training communities must develop, and the adequacy of tools available for this training development. The research approach includes the comparison of the training requirements for Active Component and Reserve Component units. Results of the research provide estimates of small unit training development requirements developed from interviews and focused surveys with experienced Soldiers. The training requirement estimates will be used to inform and guide a multi-year effort to develop and evaluate new training development tools that small unit leaders can apply to accomplish pre-deployment training that meets the commanders' needs.

Media Interaction Theory of Warfare

AbstractID: 194

Mr. Michael P Scardera
Millennium Space Systems
27917 Pontevedra Drive
Rancho Palos Verdes,CA 90275
310-245-1938
scardera@pacbell.net

Media Interaction Theory of Warfare - (Military Domain Matrix Theory): A Hypothesis Unifying Past Military Theories and a Theoretical Basis For An Independent U.S Space Force

A media interaction warfare theory is introduced, described, and exercised which integrates land, naval, air, and space forces into a coherent force structure model using matrix methods. For historical perspective, background, and context, a very cursory description is provided of previous military theorists and their ideas. The media interaction theory is based partly on extending past military theorists' work and to a large degree unifies a large body of their work. From the historical perspective, different media interactions are described which leads to a matrix representation. This matrix forms the Media Interaction Theory of Warfare's basis. An alternative nomenclature is the Military Domain Matrix Theory. With the media interaction matrix, a mathematical model based on linear algebra is proposed using varying degree matrices depending on the historical context and/or available force structure elements. The theory's construct may be manipulated by matrix algebra to represent various degree integrated Land, Sea, Air, and/or Space force structures. Force structure elements may be represented either through subjective or objective valuation. Determinants are used to provide relative evaluation and comparison between various force structures. This construct is applied to validate or refute some past military theories, help explain some past historic events, and predict future possible situations. The theory's implications and general ability to "unify" past military theories is presented. Resulting general rules are presented. Examples and sample theory applications are presented. The Media Interaction Theory may also be used to illustrate and analyze military service roles and missions as well as any force structure mix variety. The theory has significant applicability to the on-going roles and missions debate for all services, and also provides a powerful case for an independent space force. Suggestions for expanding the theory and potential future work are presented. If this theory is valid, it opens up a distinct, logical approach to joint forces analysis, modeling, and simulation and would have broad applicability to military affairs.

Applying an Analogy-Based Cost Estimating Tool to Identify 'Best-Value' Technologies

AbstractID: 74

Mr. Mark S Schankman
The Boeing Company
PO Box 516 MS 064-2233
St. Louis,MO 63166-0516
314-232-6279
FAX: 314-233-4433
mark.s.schankman@boeing.com

Mr. John W Reynolds
Pratt & Whitney Rocketdyne, Inc.
P.O. Box 7922, Mail Stop: RLB-14
Canoga Park,CA 91309-7922
818-586-4580
FAX: 818-586-4012
john.reynolds2@pwr.utc.com

Defense and aerospace technology planners and engineers are faced with a challenging problem: how to select from a multitude of alternative technology research and development projects to provide the best value (meet needs at lowest cost). New technologies must be identified and developed to provide the required performance.

The cost to develop these technologies is difficult to estimate due to inadequacies of existing cost estimating tools.

This paper will describe how a decision analysis and cost estimating tool developed and used by Boeing is used to evaluate technology R&D projects and identify best value alternatives. The tools consist of an improved decision analysis tool: “Value Front Tool (VFT)” and a new cost estimating tool: “Process-Based Estimating Economic Analysis Tool (P-BEAT).” For a representative technology evaluation at Boeing, P-BEAT was used successfully by affordability engineers to estimate the cost to mature technologies under consideration for R&D funding. The resulting costs were input into the Value Front Tool which graphically displays three factors needed by technology planners:

• The relative ability of each technology to meet a set of evaluation criteria representing both customer and company stakeholder needs. A utility score metric (a measure of satisfaction in meeting the needs) was derived and compared for each alternative.
• The cost to mature each technology through planned research and development activities.
• The uncertainty, at a given degree of confidence, for the set of utility score and cost predicted for each technology alternative.

This new process and tools have the benefit of reducing reliance on subjective opinions regarding the relative benefits of alternative technology development projects.

P-BEAT was designed specifically to address inadequacies of commercial tools to meet the needs of engineers and technology planners. This paper will illustrate several unique features of P-BEAT through example applications that provided the capabilities needed to estimate the development cost of alternative technologies. P-BEAT helps Systems Engineering make decisions critical in the early phase of product life cycle affecting the life cycle cost and performance of systems and technologies.

Security, Stability, Transition and Reconstruction Capacity Gap Analysis

AbstractID: 143

Mr. Duane T Schilling
Center for Army Analysis
6001 Goethals Road
Fort Belvoir,VA 22060-5320
703-806-5674
DSN: 656
FAX: 703-806-5750
duane.schilling@conus.army.mil

The SSTR Capacity Gap Analysis was part of a collaborative effort between TRADOC Analysis Center – Fort Leavenworth and the Center for Army Analysis to answer a series of questions about capability and capacity gaps for the G-3/5 Stability Operations Office (SSO). The study identified gaps in Army capacity to conduct Stability Operations and isolated the gaps from other global causes. Prior to this study no systematic approach had been used to isolate or quantify this type of stress on the various units used for SSTR operations. In order to establish a test environment for assessing capacity gaps this study elaborated on an existing Defense Planning Scenario to investigate the tasks, along with associated conditions and standards that a division level force could expect to conduct as part of phase IV-V operations. From this list of tasks, the types and numbers of units to accomplish the missions were determined. Then, the study used a discrete event simulation of deployments and rotations with other global force demands in a future environment to measure shortfalls and stress across future force structure requirements. Shortfalls and stress were measured by the number of days that demands for forces were missed and the deploy-to-dwell ratios for deploying units. The presentation will explain final result of strategic theater level analysis which included assessment of capabilities not considered during the initial phase of the analysis.

Operational Analysis in Support to IED Defeat, MND-N (25th ID), OIF, Jan-Oct 07

AbstractID: 373

MAJ Russell J Schott, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1400, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-1777
DSN: 258-1777
FAX: 575-678-8379
russ.schott@us.army.mil

During their rotation as the Division Headquarters of Multi-National Division-North, Operation Iraqi Freedom, September 2006 - October 2007, the 25th Infantry Division established the Improvised Explosive Device (IED) Defeat cell to create a standing, fully integrated staff section responsible for planning, coordinating and synchronizing the MND-N main effort to “Defeat IED Networks.” As a multi-functional, non-doctrinal staff organization in the modular Division Headquarters, the IED Defeat cell analyzed the complexity of the IED networks in MND-N and

allowed the Division to focus combat action against enemy vulnerabilities. In Jan 07, the 25th ID augmented their IED Defeat cell with an Army Functional Area 49, Operations Research/Systems Analyst (ORSA) for the first time. This presentation will focus on the critical role of the ORSA in the Division-level IED Defeat cell, providing an overview of the strengths and weaknesses of MND-N IED Defeat cell organizational structure, manning, and priorities. Discussion will encompass many aspects of ORSA analysis in support of both IED Defeat (offensive measures) and Counter-IED (defensive measures) operations. Discussion will include strengths and weakness of current analysis in areas to include analysis of significant event data to identify trends, allocation of resources, planning and assessments of operations, data management, analysis of alternatives, risk management, training, as well as others.

Determining the Educational Value to Graduate Students Participating in the International Macroeconomics Exercise

AbstractID: 45

COL John C Sees, USA
Industrial College of the Armed Forces
408 4th Avenue
Fort McNair,DC 20319
202-685-4761
FAX: 202-685-4175
john.sees@us.army.mil

This paper presents the results of a study led by the Industrial College of the Armed Forces (ICAF) to determine the educational value to graduate students participating in the group centric, computer-aided, strategic economic policy exercise. This study is important since the exercise is resource intensive in faculty preparation time and software licensing fees. The study team planned and conducted this study in several parts. First the team wrote student-focused, self-assessment questions tied to the learning objectives of the exercise. The study team then validated the questions through independent expert critique. Next the study team set up hypothesis tests, identified and controlled the surveys for biases, and constructed the experimental design for the effort. Using student pre- and post- exercise surveys, the study team gathered ordinal data to assess the change in the student's learning.

Measuring Progress and Performance from EWIRDB to NGES

AbstractID: 93

Ms. Melanie B Selman
Dynetics, Inc.
1002 Explorer Blvd.
Huntsville,AL 35806
256-964-4794 FAX: 256-964-4038
melanie.selman@dynetics.com

The Electronic Warfare Integrated Reprogramming Database (EWIRDB) is the primary DoD approved source for technical parametric and performance data on non-communication electronic emitters and associated equipment. The Defense Intelligence Agency (DIA) is currently transitioning from the EWIRDB which displays parameters through a flat text file to the Next Generation EWIRDB System (NGES) which uses a modeling approach to depict the behavior of the different radars. This project is developing a performance measurement system that can be used to measure the data migration from EWIRDB to NGES along with the status of NGES file updates. This system uses decision analysis techniques by ranking and weighting radar threat systems to provide analysts and managers a tool for performance measurement, workload management, and scheduling. These metrics can be used to optimize the management of NGES. Efficient management of NGES is critical to supplying the warfighter with the best intelligence available.

Parameterizing Activity Time Distributions for Reusable Military Launch Vehicle Regeneration Modeling

AbstractID: 428

Capt. Joseph A Servidio, USAF
Air Force Institute of Technology
2950 Hobson Way, Bldg 641
Wright-Patterson AFB,OH 45433
937-255-3636
joseph.servidio@afit.edu

Dr. Alan W Johnson, USAF
Air Force Institute of Technology
2950 Hobson Way, Bldg 641
Wright-Patterson AFB,OH 45433
937-255-3636
alan.johnson@afit.edu

Existing Air Force expendable launch vehicles are not responsive: months of flight preparation are typically required and launch costs are high. Consequently, the Air Force seeks a reusable military launch vehicle (RMLV) that can be launched inexpensively and quickly regenerated between flights. To help evaluate candidate designs, Air Force Research Laboratory (AFRL) personnel are developing the Space Access Vehicles Mission and Operations Simulation (SAVMOS) design environment. One SAVMOS shortcoming is that it could not model vehicle regeneration activities between missions. Our initial research objective was to develop and validate a SAVMOS discrete-event simulation module that can assess candidate RMLV recovery, maintenance, and prelaunch concepts, by developing a conceptual task flow based the respective B-2 bomber, shuttle, Delta IV, Atlas V, Minuteman III, and Zenit 3SL's regeneration and/or launch processes. Further research estimated the associated support personnel staffing requirements, in terms of needed skills and associated manpower quantities.

Our current research seeks to improve the fidelity of the simulation module by developing regression models of each model's activity time probability distribution parameter values versus factors such as vehicle spatial orientation, size, and work surface orientation. Our goal is to improve the simulation module's fidelity by defining distribution parameters as functions of vehicle design decisions.

Dealing with 90th Percentiles as a Measure of Error

AbstractID: 345

Mr. Houston A Sewell, USAF
28 TES/DOG
203 W. D Avenue
Eglin AFB,FL 32542
850-882-1845
DSN: 872-1845
houston.sewell@eglin.af.mil

Circular error probable (CEP) has been the standard measure of error for weapon and navigation systems accuracy for many years. Increasingly, particularly in the field of weapons accuracy, a more restrictive value is desired. It is no longer acceptable to say that 50% of weapons will theoretically fall outside the measure given to the users in the field. With modern collateral damage concerns, circular error 90 (CE90) has become a commonly used value. CE90 is analogous to CEP, but utilizes a 90% circle rather than a 50% circle. This becomes problematic if the true probability distribution of the event is unknown. An event in the outer 10% of a distribution is after all, by definition, rare. How well can we estimate events that are that far out “in the tails”? Do the estimates have any meaning in the “real” world? What are the pitfalls of utilizing CE90? This project will examine these questions by experimentation on both real-world data and synthetic data with known probability distribution characteristics.

Consequence Management Response Study

AbstractID: 550

Mrs. Lisa Seymour, OSD
OSD, PA&E, Simulation and Analysis Center
1401 Wilson Blvd, Suite 300
Arlington ,VA 22209
703-696-9360x3324
Lisa.Seymour.ctr@OSD.mil

The Department of Defense is in the process of configuring and sourcing Consequence Management (CM) response forces. These forces are intended to augment overwhelmed local and state response mechanisms in a catastrophic event. The objective of our study will be to determine the demand (based on effects of the National Planning Scenarios) and the supply (capabilities) of the consequence management response units from DoD and other early responders. Our analysis will evaluate capability gaps or overmatch, where current and projected capabilities fail to meet or exceed projected national planning scenario demands.

Modeling BRAC Effects in the Army Civilian Forecasting System

AbstractID: 492

Mr. Richard Shaffer
AG1-CP TD
2461 Eisenhower Avenue
Alexandria,VA 22331
703-325-1585
DSN: 221-1585
FAX: 703-325-3894
richard.a.shaffer1@us.army.mil

The Army Civilian Forecasting System is a large scale, computer modeling system developed to forecast strength and staffing requirements for the civilian workforce. CIVFORS has been used in the past to successfully predict, with greater than 98% accuracy, civilian strength in aggregate through budget and execution years. Army is currently developing a standard process to incorporate CIVFORS forecasts at the Command level to support the development of detailed recruiting plans to help sustain the workforce into the future. The requirement to model organization levels within Commands, including subordinate commands and units presents significant challenges to traditional, Markov techniques included in the model to forecast staffing actions and attrition. Commands affected by BRAC are particularly complex and difficult to model. This presentation will highlight the major modeling challenges in developing Command level forecasts and the techniques and approaches used to address these challenges and provide meaningful information to Army leaders and workforce planners.

The CREATIVE Decontamination Performance Model

AbstractID: 78

Ms. Erin E Shelly
US Army RDECOM ECBC
5183 Blackhawk Road
Aberdeen Proving Ground,MD 21010
410-436-1937
FAX: 410-436-2165
erin.shelly@us.army.mil

Dr. Brent Mantooth
US Army ECBC
5183 Blackhawk Road
Aberdeen Proving Ground,MD 21010
410-436-0967
brent.a.mantooth@us.army.mil

Dr. Roger Davis
OptiMetrics, Inc.
100 Walter Ward Boulevard
Abingdon,MD 21009
410-569-6081x129
rdavis@optimetrics.org

Mr. Joshua Combs
US Army RDECOM ECBC

5183 Blackhawk Road
Aberdeen Proving Ground,MD 21010
410-436-8014
joshua.c.combs@us.army.mil

The CREATIVE model uses a deterministic, semi-empirical approach to model the chemistry and physics of the decontamination process to enable the prediction of efficacy for decontaminants, using minimal experimental testing. The model addresses decontamination efficacy for operational surfaces, realistic threat challenges, environmental conditions, and decontamination process parameters that result in an ability to predict contact-hazards, vapor-hazards, and residual agent for various decontamination process conditions. The construction of the model focuses on modeling each of the process steps associated with decontamination testing.

The first generation of the CREATIVE interim development model is the foundation of a decontamination model. The different agents and materials tested in this model present a variety of agent-material-decon interactions that require specific modeling, such as agent absorption into materials. A module-based architecture is used to construct the model incorporating flexibility for future expansion to include additional agents, materials and user interfaces as future needs arise. The final CREATIVE model will provide the capability to predict decontamination efficacy at untested conditions and serve as a reference tool to judge the performance of decontaminants.

Estimating Performance of a Standoff Biological Detection System Against Actual Biological Warfare Agents

AbstractID: 104

Dr. Kensuke Shirakawa, USA
US Army Evaluation Center
4501 Ford Avenue
Alexandria,VA 22302-1458
703-681-0736
DSN: 761-0736
FAX: 703-681-3365
Ken.Shirakawa@US.army.mil

Mr. Charlie Holman, USA
US Army Evaluation Center
4501 Ford Avenue
Alexandria,VA 22302-1458
703-681-3365
DSN: 761-3365
FAX: 703-681-3365
Charlie.E.Holman@ATEC.army.mil

Dr. Carl T Russel
CTR Analytics
2430 Linenhall Court
Colorado Springs,CO 80920-7605
719-338-2404
ctranalytics@earthlink.net

Operational evaluation of detection systems for biological warfare agents (BWAs) is restricted in the United States by legal and statutory prohibitions against open air releases of live BWAs. Systems with reduced effective range of a few meters, such as point detection systems, can undergo limited testing with live BWAs inside containment chambers; however, those with an extended range of several kilometers, such as the Joint Biological Standoff Detection System (JBSDS), can not be adequately tested within the confinements of current chamber facilities. Operational testing for such systems therefore requires field releases of “simulants”, i.e., non-lethal agents with otherwise similar biological characteristics as actual, live BWAs.
For the JBSDS, an evaluation methodology has been developed for transforming simulant field performance to expected BWA performance. This paper will briefly discuss the methodology, and graphically demonstrate some results.

Aviation Weather Routing Tool: A Decision Aid for Manned/Unmanned Aircraft Routing

AbstractID: 514

Dr. Richard Shirkey
Army Research Laboratory
Attn: AMSRD-ARL-CI-EM
WSMR,NM 88002-5501
575-678-5470
DSN: 258-5470
FAX: 575-678-4449
rshirkey@arl.army.mil

Mr. Terry Jameson
Army Research Laboratory
Attn: AMSRD-ARL-CI-EM
WSMR,NM 88002-5501
575-678-3924
DSN: 258-3924
tjameson@arl.army.mil

Technology developed in support of the growing U.S. military’s use of Unmanned Aircraft Systems (UAS) answers the requirement for fine-tuned precision weather forecasts, enroute updates of weather conditions, and graphical product displays that have not been met by current forecasting and data presentation capabilities. A new Aviation Weather Routing Tool (AWRT) capability addresses the complexity of forecasting the weather impacts upon UAS operations for a 4-D flight route. AWRT applies both rules-based and physics-based prediction methods to generate an atmospheric impacts grid across a given airspace and forecast period. This weather impacts grid is then applied to specific, user-defined flight routes; and a route optimization scheme is employed to determine the best (lowest weather risk) alternative route(s) to the target area or desired destination point. AWRT accounts for all aspects of the mission’s flight profile, from launch to recovery, at various intermediate waypoints and required flight levels; thus AWRT provides a true mission planning and execution routing tool for UAS. This same technology also has promising potential applications for manned aircraft operating in both military and civilian airspaces.

IP/IA Considerations for Technical Performance Criteria for Nuclear Command and Control

AbstractID: 551

Mr. Michael J Silberglitt	**Mrs. Laura A Nolan**
The Johns Hopkins University Applied Physics Laboratory (JHU	The Johns Hopkins University Applied Physics Laboratory (JHU
11100 Johns Hopkins Rd	11100 Johns Hopkins Rd
Laurel,MD 20723	Laurel,MS 20723
240-228-8261	240-228-5000
FAX: 240-228-6345	laura.nolan@jhuapl.edu
michael.silberglitt@jhuapl.edu	

In light of the push for USSTRATCOM missions to include packet-switched, IP- based networking, The Johns Hopkins University Applied Physics Laboratory (JHU/APL) was tasked by the OASD/NII to determine any specific performance metrics necessary to ensure Command and Control (C2) functions are still successful. In more specific terms, the task was to determine any necessary changes to existing performance criteria to account for IP and IA concerns. The study identifies IP/IA performance metrics not sufficiently addressed in certain requirements documents. In addition a methodology is developed using quantitative and qualitative metrics to evaluate the Cyber Incident Level (CIL), a term introduced to represent the level of Computer Network Attack/Computer Network Exploitation (CNA/CNE) on a blue force computer network. A methodology is also developed to use the CIL concept in comparing system degradation resulting from CNA/CNE to degradation caused by other types of attack. Although the study was limited to specific portions of the C2 system, performance metrics and the associated methodologies discussed in the analysis could be applied to broader national missions.

Credentialing: A Mechanism for Improving Operations Analysis and Operations Research Professional Development

AbstractID: 77

Mr. Robert L Simons	**Dr. Michael S McCoy**
The Boeing Company	The Boeing Company
P.O. Box 516 MC S270-2810	P.O. Box 516 MC S270-2810
St. Louis,MO 63166-0516	St. Louis,MO 63166-0516
314-234-3107	314-233-0524
FAX: 314-233-7338	FAX: 314-233-7338
robert.l.simons@boeing.com	michael.s.mccoy@boeing.com

Demand for operations research and operations analysis has created a workforce far more multidisciplinary in composition than ever before.

The analytical challenges facing our community grow more complex and diverse, resulting in a workforce increasingly comprised of practitioners drawn from areas other than traditional operations research, such as economics, engineering, and operational areas linked to the physical and social sciences. Organizations shape their workforce education, experiential, and training criteria to address unique goals and objectives but lack an effective mechanism to offer their analytical value criteria to the community as a whole. This leads to divergence across the analytical community by limiting shared awareness, joint recognition, and overall acceptance of fundamental analytical criteria and standards that bind together and expand the value proposition of the overall analysis community.

An operations analysis and operations research Credential represents a partnership devoted to increasing the value of our community, our workforce and our customers. A community-sponsored credential illustrates community-defined criteria and standards regarding education, training, recognition and professional development. A rigorous credential fosters an analytical community that is stronger, more collaborative, and more interoperable than ever before.

Our community is improved through analytical products and services enhanced by rigorous measures linked to competency, education, language, skills, and training standards. Our constituent organizations benefit through greater awareness of the overall community and the opportunities that insight provides to strengthen and deliver organizational value. Our analyst workforce gains a robust, community-sponsored credential that not only recognizes achieved professional goals, but helps shape personal and career professional development and advancement strategies. Our stakeholders benefit as we move from an independent multidisciplinary analytical workforce towards a more cohesive interdisciplinary and interoperable community.

We propose a community partnership of professional organizations, government, industry, academia and other stakeholder representatives to collaboratively define, develop, deploy, and operate a professional credentialing device on behalf of the extended operations analysis and operations research workforce. We believe a Credential is in the best interest of our community. It should reflect a collaborative, community-driven approach that helps address current and future analysis challenges and standards, objectives, training and education, and professional opportunities.

Design of Experiments

AbstractID: 525

Dr. James R Simpson, USAF	**Mr. Greg Hutto, USAF**
53 TMG	46 TW
Bldg 351 Suite 608	Room 229 Bldg 1 West D St
Eglin AFB,FL 32542	Eglin AFB,FL 32542
850-882-0607	850-882-4646
simpson@eng.fsu.edu	gregory.hutto@eglin.af.mil

For the past 8 years, the Air Combat Command's 53 Wing has been using Design of Experiments (DOE) as its principal method of test, with great success. Benefits include faster tests, fewer test resources, and greater system understanding all while increasing the confidence in test

results. From digital simulation to engineering-oriented hardware-in-the loop, to operational flight test, we're now using DOE in nearly all tests. This four- hour tutorial will introduce attendees to DOE -- a powerful methodology for test and evaluation. We address the history of DOE, compare it to other popular test strategies, and describe a four-step process to simultaneously deal with more that one variable (e.g., weather, target signatures, aircraft profile, threat scenario, etc.) and their effects on the MOE or response variable.

Finally, we outline a method to deploy it throughout an organization.

The attendee will be able to design simple factorial experiments with up to 4 variables, know what kinds of designs novices should avoid (Scenarios, One Factor At a Time, Taguchi, Plackett Burman, D-optimal), and know when to look for help. Interested students might include:

Operations analysts, scientists, engineers, mathematicians, and technical supervisors responsible for projects involving experimentation, R&D, test and evaluation, qualification, or digital simulation. Prerequisites: current familiarity with applied statistics through the t-test is helpful but not required. Attendees will be supplied with course slides, reference papers, an annotated bibliography, Web links and a list of contacts for further information.

Probability of Negation for Cruise Missiles Using Least Defendable Routes

AbstractID: 462

Dr. Nigel S Siva	**Dr. Sean K Collins**	**Mr. Paul A Bigelman**
SPARTA, Inc.	SPARTA, Inc.	MDA / DEEG
1911 North Fort Myer Drive, Suite 1100	1911 North Fort Myer Drive, Suite 1100	71 Defense Pentagon
Arlington,VA 22209	Arlington,VA 22209	Washington, D.C.,DC 20301-7100
703-797-3103	703-797-3027	703-693-1801
FAX: 703-558-0045	FAX: 703-558-0045	FAX: 703-695-2725
Nigel.Siva@sparta.com	Sean.Collins@sparta.com	Paul.Bigelman@mda.mil

Probability of Negation PN of an enemy missile depends upon its path from its launch point to its intended asset (target). Since Ballistic Missile (BM) trajectories can be predicted uniquely, once the BM's trajectory is known, then its PN can be calculated in terms of the probabilities of success in the three major functions: Sensor, BM/C4I and Weapon. In contrast, the Cruise Missile (CM) route between its launch point and its intended asset is preplanned by the enemy, based upon his perception of the defense's performance and beddown, so that his CM will take the route of maximum Probability of Survival PS (corresponding to minimum predicted PN) while in transit. This particular route is called the Least Defendable Route (LDR) for the defense, while it is the Least Threatening Route (LTR) for the offense. In our method, Poisson density is used to define a risk field (risk per unit route–length along source–type eight cardinal directions) in terms of Probability of Detection, Engagement Volumes (volumes of space where engagements are feasible) and Engagement Lengths (length between successive engagements for each engagement unit). The LDR between two points is found by directly maximizing PS through minimizing the cumulative risk defined as the sum of risk along a route connecting those two points using the D'Esopo–Pape Algorithm. The resulting maximum PS contour map represents the offense's perception of vulnerability. For the same LDR's, one can perform a model simulation, including additional details, and generate the defense's minimum PN contour map. These two maps (PS and PN) provide complementary views for CM Defense. This method can be extended to enemy aircraft routes and it has potential applications in Homeland Security.

OTC Analytic Simulation and Instrumentation Suite (OASIS) Brings Live Players to MATREX

AbstractID: 55

Mr. Jimmie S Smith, USA	**Mr. Gary M Smith**	**Ms. Lana E McGlynn**
OTC Analytic Simulation and Integration Suite (OASIS) Integr	DAS/MATREX	MCG/MATREX
ATTN: TEOT-TT 91012 Station Avenue	6035 Burke Centre Parkway	1805 Crystal Drive Suite 406
Ft Hood,TX 76544-506	Burke,VA 22315	Arlington ,VA 22202
254-288-9557	703-425-2205	703-980-8546
Jimmie.Shiloh.Smith@us.army.mil	gsmith@d-a-s.com	lana.mcglynn@gmail.com

In February 2007, personnel from the Modeling Architecture for Technology and Research EXperimentation, (MATREX) Program, a Research, Development and Engineering Command (RDECOM) and the US Army Operational Test Command (USAOTC) began exploring potential partnering and teaming opportunities. Specifically, whether or not there was a way to incorporate a richer live integration into the MATREX federation. Guided by the requirements of their customers, USAOTC decided to pursue linking these systems together through the MATREX Federation Object Model (FOM) and run-time infrastructure (RTI) to create a true system of systems (SoS) test capability under a program called OASIS Integration. This presentation will focus on the details of the work accomplished and the benefits of this cooperative effort.

The MATREX and USAOTC Modeling and Simulation (M&S) technologists met to discuss each programs' capabilities, requirements, and plans. Several areas were identified as holding potential benefit to both organizations. One area identified was data exchange requirements to bring live players into the MATREX federation and to interact with RDECOM models, through the use of the Operational Test Tactical Engagement System (OT-TES) and its Common Data Link (CDL). Another area identified was OTC leveraging the MATREX tools to move to an HLA environment. This included using ProtoCore, which enables future compliance with such standards as RTI1516 and Test and Training Enabling Architecture (TENA) without the cost of rebuilding their source code.

Within the last year OTC, has conducted a series of integration events (IEs) to "stand up" a Modeling, Simulation and Instrumentation (MS&I) capability. A fully "distributed" HLA capability is expected in FY08 thru FY09. The tools utilized during these events have been termed "JOSIE+1." The 2007 IEs have been very successful and clearly demonstrated a number of firsts for USAOTC MS&I and its federation partners. Foremost among them was the seamless integration of live (OT-TES) and constructive (JOSIE and MOSS) within a robust and high granularity environment. However, as mentioned earlier, this was made possible by the capability demonstrated by PM MATREX HLA and their responsive workforce. A discussion of a subset of the MATREX tools follows in paragraph two.

Communicating for Effect: Operationalizing and Analyzing Influence Weapons

AbstractID: 171

Col. Jeffrey J Smith, USAF
Air Force Fellows Program, Argonne National Lab
9700 South Cass Avenue, Building 223
Argonne,IL 60439-4832
630-252-7861
FAX: 630-252-3193
jjsmith@dep.anl.gov

Dr. Clayton P Bowen, USAF
AF/A9
1777 North Kent Street
Arlington,VA 22209
703-588-8848
DSN: 425
FAX: 703-696-8738
clayton.bowen@pentagon.af.mil

Maj. Michealangelo Gallucci, USAF
AF/A9
1777 North Kent Street
Arlington,VA 22209
703-588-8683
DSN: 425
FAX: 703-696-8738
mike.gallucci@pentagon.af.mil

Mr. James Muccio, USAF
AF/A9
1777 North Kent Street
Arlington,VA 22209
703-588-8688
DSN: 425
FAX: 703-696-8738
jim.muccio@pentagon.af.mil

As far back as Sun Tzu, military thinkers have recognized the objective in war is to persuade the enemy to bow to our will. But the operational bias of both military leaders and analysts has often ignored this precept to concentrate on kinetic effects and more concrete measures of effectiveness. This bias threatens to skew both the conduct of war at the operational level, and force structure decisions made on the basis of military operational analyses.

Influence weapons attempt to apply the principles of persuasive and coercive diplomacy to individuals, groups, and populations. Although the principles of applying coercive diplomacy to decision makers have been explored in some depth, the theoretical bases for shaping of the attitudes and behaviors of populations and large subsets of populations is much less well developed.

Three major obstacles to effective influence operations can be identified: poor integration of influence operations into the planning process due to unrealistic expectations, poor definitions, and confusing or inadequate terminology; an intelligence vacuum concerning target individuals or populations and estimates of the effectiveness of various influence techniques/weapons against those targets; and a the lack of credible assessment/analysis methodologies and measures of effectiveness. A framework and lexicon for developing and analyzing influence weapons will be presented to map out the challenges of developing analytical techniques that would allow more effective development and assessment of influence campaigns.

Power and Sample Size in a Logistic Regression Design Context

AbstractID: 196

LTC Michael J Smith, USA
J84 Studies & Analyses, US Pacific Command
HQ USPACOM
Camp Smith,HI 96861
808-477-7863
michael.smith23@us.army.mil

We investigate the performance of modified likelihood ratio tests in the binary logistic regression context. Rather than using χ^2, the asymptotic approximation to the null distribution, we instead use empirical distributions under H_0 that preserve sample-size dependency. We conduct the requisite sampling at various sample sizes and under various choices for model parameters. We believe this work provides an extension to design of experiments (DOE) methods by enabling estimation of required design replication to achieve desired power against specified alternatives in case the response variable of interest is binary.

Using VFT and Optimization to Create the Acquisition Portfolio for the Marines Infantry Optics

AbstractID: 235

Maj John E Smith, USMC
Marine Corps Systems Command
2200 Lester Ave.
Quantico,VA 22134
703-432-3835
DSN: 378-3835
john.e.smith1@usmc.mil

Mr. Fred Daubenspeck
Booz, Allen & Hamilton
25 Center St.
Staffod,VA 22534
540-288-5028
daubenspeck_frederick@bah.com

Mr. Russell Mosier
IDI
PO Box 231660
Centreville,VA 20120
703-727-9102
rbmosier@innovativedecisions.com

Dr. Harry Newton
IDI
PO Box 231660
Centreville,VA 20120
703-727-9102
harry.newton@innovativedecisions.com

Mr. A.J. Maltenforth
Booz Allen & Hamilton
25 Center St.
Stafford,VA 22534
540-288-5028
amaltenfort@snap.org

Dr. Dennis Buede
IDI
PO Box 231660
Centreville,VA 20120
703-727-9102
Dbuede@innovativedecisions.com

The Marine Corps has 35 different optics systems in its inventory and acquisition pipeline. In this study, we develop two models: An Individual Optics (IO) Model to evaluate similar optic systems; and, a Family Of Individual Optics (FOIO) Portfolio Model that compares potential

portfolios.

The IO model is based on Value-Focused Thinking. The goals and attributes were developed with active duty marine infantry instructors. By choosing a representative set of scenarios from the Marine Expeditionary Rifle Squad Capability Matrix Final Report, the model allows differentiating the importance & value curve for each attribute based on the marine's role (leader, gunner, etc), the usage of the optic (handheld, head mounted, or weapons mounted), and the mission (Attacking a Fortified Position, Conduct Urban Patrol, etc). Physics-based attribute data on current and candidate systems was provided by a technology panel from _____. A cost team accumulated the costs for existing systems and estimated the costs for new systems by analogy to existing systems considering the Technical Readiness Level data and other factors.

The FOIO Portfolio Model evaluates the suite of optics that would be present in a Rifle Company and heavy machine gun platoon equipped with a particular portfolio of optics systems. The FOIO model includes strategic goals, such as maximizing the sustainability of the overall optics program by minimizing the number of unique systems and meeting the study objective of minimizing the burden of weight of the optics systems that must be carried by the Marine. The FOIO model uses the Excel Solver to develop candidate portfolios that meet a large number of constraints on the allocation of optics systems to each position within the Rifle Company, so that the solution covers the set of tasks needed for each position, as well as operational considerations. The resulting candidate portfolios are compared against the current and program of record baseline.

The IO model was used for POM-10 inputs this fall and along with the FOIO model will be used for the next POM cycle.

Review and Assessment of Chlorine Mammilian Lethality Data and the Development of a Human Estimate

AbstractID: 110

Mr. Douglas R Sommerville, USA
US Army Edgewood Chemical Biological Center
5183 Blackhawk Road (ATTN: AMSRD-ECB-RT-IM)
Aberdeen Proving Ground,MD 21010-5424
410-436-4253
DSN: 584-4253
FAX: 410-436-2742
douglas.sommerville@us.army.mil

Ms. Sharon A Reutter-Christy,
US Army Edgewood CB Center
5183 Blackhawk Road ATTN: AMSRD-ECB-RT-TT
Aberdeen Proving Ground,MD 21010-5424
410-436-2686
FAX: 410-436-5239
sharon.reutter@us.army.mil

Ms. Erin E Shelly,
US Army Edgewood CB Center
5183 Blackhawk Road ATTN: AMSRD-ECB-RT-TT
Aberdeen Proving Ground,MD 21010-5424
410-436-1937
FAX: 410-436-2742
erin.shelly@us.army.mil

Mr. John J Bray,
Optimetrics, Inc.
100 Walter Ward Blvd., Suite 100
Abingdon,MD 21009
410-569-6081 x113
jbray@optimetrics.org

Mr. Raymond E Jablonski,
Chemical Security Analysis Center, US DHS
5183 Blackhawk Road
Aberdeen Proving Ground,MD 21010-5424
410-436-3566
raymond.jablonski@us.army.mil

New human estimates for chlorine inhalation lethality as a function of exposure duration (for a healthy subpopulation and the general population) were derived via a review and statistical analysis of existing mammalian lethality data. Such estimates are needed to support risk assessments and casualty predictions involving chlorine airborne releases. At present, casualty predictions for such releases are at odds with what has been observed historically; the predicted downwind hazard area has often been much larger than what was actually observed. Either the present toxicity estimates are too low, the currently popular atmospheric transport and dispersion (ATD) models cannot adequately model chlorine releases, or both.

Median lethal dosage and quantal response data were found and analyzed for eight species (mouse, rat, guinea pig, rabbit, cat, dog, goat and sheep) and for durations from 8 to 235 minutes. The base 10 probit slope (concentration) was estimated via the weighted average of experimentally measured slopes in mammalian lethality studies. Resulting human lethality (military) estimates as a function of exposure duration were expressed via the toxic load model. General population estimates were derived from the military estimates using the mathematical method of Crosier (2007).

Previous human estimates were reviewed and one study identified as corresponding to the lower confidence limit for the new general population estimate. The impact of the new estimate was evaluated through a series of transport and dispersion modeling runs for the catastrophic accidental release of 50 tons of chlorine from a tanker car. The sensitivity of downwind hazard distances was also investigated as a function of median lethal toxic load, toxic load exponent and probit slope values.

Analyzing Sustainment Battle Command Enablers via Layered Networks in Discrete Event Simulations

AbstractID: 243

LTC Rich Spainhour, USA
U. S. Army TRADOC Analysis Center, Monterey
P.O. Box 8695
Monterey,CA 93943
831-656-7579
rich.spainhour@us.army.mil

Mr. Leroy Jackson
U. S. Army TRADOC Analysis Center, Monterey
P.O. Box 8695
Monterey,CA 93943
831-656-3732
leroy.jackson@us.army.mil

Emerging Future Force (FF) logistics doctrine emphasizes near-realtime sustainment operations conducted in a fluid battlespace with minimal impact on the operational tempo. The Army will rely on technological enablers to achieve this revolution in logistical responsiveness. These enablers will monitor each unit's supply and maintenance status, post and update unit statuses to the logistics portion of the higher echelons' Common Operating Picture (COP), and provide decision support and command and control tools for the Logistics Battle Captain as he or she prosecutes the sustainment battle.

Analysts have struggled to represent FF logistics doctrine, and the enablers that make it possible, within the current suite of combat simulations. Logistics Battle Command for Echelons Above Brigade (LBC4EAB), a Java-based Discrete Event Simulation currently under development by the US Army Training and Doctrine Command Analysis Center (TRAC), simulates the effects of FF logistics enablers using

layers of networks (Geographical Network, Communications Network, Task Network) to capture the impact of situational awareness gaps between ground truth and what the Logistics Battle Captain believes to be true.

G-BOSS MUA: Supporting Engagement Level Analysis and Constructive SEAS Modeling Adaptation

AbstractID: 99

Mr. Brian Spanbauer ATK 5011 Indian School, Suite 500 Albuquerque,NM 87110 505-853-3662 brian.spanbauer@kirtland.af.mil	**Mr. Taylor Mitchell** SPARTA, Inc. 2401 E. El Segundo Blvd, Suite 100 El Segundo,CA 90245 310-727-0950x125 taylor.mitchell@sparta.com	**Mr. Eric Frisco** SPARTA, Inc. 2401 E. El Segundo Blvd, Suite 100 El Segundo,CA 90245 310-727-0950x109 eric.frisco@sparta.com
Mr. Gary Fauss ATK 5011 Indian School, Suite 500 Albuquerque,NM 87110 505-853-6078 DSN: 263 gary.fauss@kirtland.af.mil	**Ms. Lynda Liptak** ARA 4300 San Mateo Blvd, NE, Suite A-220 Albuquerque,NM 87110 505-816-6364 lynda.liptak@ara.com	**Ms. Monica Montoya, USAF** AFRL/RVES 3550 Aberdeen Ave SE Kirtland AFB,NM 87117-5776 505-853-6196 monica.montoya@kirtland.af.mil

A key element to any system-of-systems concept of employment is having a solid understanding of performance at the individual system level with respect to its operating domain. With respect to the AFRL/RVES Geo-Based Optical Space Surveillance (G-BOSS) Military Utility Assessment (MUA) and the development of a supporting employment concept, this required us to have a more solid understanding of the orbital dynamics involved, constraints on sensing and data processing, and the subsequent implications for the G-BOSS system response to such factors. With insufficient legacy systems to learn from, the G-BOSS study team relied heavily on system level modeling and simulation tools. The briefing will center on the technical implementation of the G-BOSS employment concept into the System Effectiveness Analysis Simulation (SEAS) modeling environment, and address various supplemental analyses performed to help justify the study's employment concept assumptions. The briefer will discuss high level aspects of the model development process, the responsive adaptation of the SEAS tool for unique modeling requirements, integration of a specialized C++ maneuver planner, and the iterative development and test process used to validate and modify key assumptions.

Fitness Report Objective Ranking Matrix

AbstractID: 2

CDR David Spoerl, USN
US Naval Academy
572 Holloway Road
Annapolis,MD 21402
410-293-6713
spoerl@usna.edu

Most organizations provide their employees with annual reviews. These reviews include quantifiable information and allow supervisors the opportunity to focus on the positive and negative aspects of the personnel. The supervisor is able to determine the relative value of each employee within each of these groups. This system works well for small groups within an organization, but when the size of the group is expanded and interactions are limited this process has its drawbacks.

The Navy annually ranks their officers, by rank within each unit, and provides individual reviews view fitness reports (FITREPs). These FITREPs are then used by Navy promotion boards to select individuals for promotion to the next rank. Each command ranks individuals based on their rank (CDRs versus CDRs, CAPTs versus CAPTs,…). For small organizations this process can easily be conducted by a few personnel that have frequent interactions with each individual being ranked. Larger organizations have a more challenging problem as interactions between the junior and senior are greatly reduced. This situation relies on a "brag sheet" and the support of each officer's supervisor to earn a high ranking within the overall group. A gathering of senior officers, a "ranking board" is convened to provide the commanding officer with a ranked list of officers.

To reduce the subjectiveness in the large group a weighted scoring system is developed to objectify each individual. This weighted system attempts to take into account the differences in individual assignments, collateral duties and time in rank issues. This system does allow for some subjective grading, but greatly reduces the impact on overall ranking. The weighted scheme is agreed upon by the ranking board prior to convening.

The overall scheme ranks individuals in several categories. Each category may have several subcategories. Each of the subcategories has their on scoring system and weight. The individuals are then sorted to provide the ranking board and/or the commanding officer with an initial ranking of the personnel being evaluated.

Global Force Management Data Initiative

AbstractID: 210

Mr. George G Sprung, JCS	Dr. James G Stevens , OSD
JCS/J8/MASO 8000 Joint Staff Pentagon Room 2C646 Washington,DC 20318-8000 703-697-7413 FAX: 703-614-4706 george.sprung@js.pentagon.mil	OSD(PA&E)/Joint Data Support 2521 South Clark Street Suite 550 Arlington,VA 22202 703-699-1702 DSN: 499-1702 FAX: 703-601-0357 james.stevens@osd.mil

This briefing is an overview of the Global Force Management Data Initiative (GFM DI). GFM DI is a Joint Staff and OSD initiative to standardize force structure representation, making it visible, accessible, and understandable across DoD. Unique identifiers will associate billets, crews, equipment, and chain of command links, enabling electronic manipulation across multiple systems. GFM DI establishes an information exchange data standard enabling DoD systems to exchange force structure data in a common format while exploiting the net-centric data environment. GFM DI is not tied to any particular hardware, operating system, or database, and is a key enabler for the Defense Readiness Reporting System, Global Visibility Capability (GVC), Adaptive Planning, and other future programs requiring authoritative forces structure data. The end goal of GFM DI is to integrate the three force management processes – assignment, allocation, and apportionment – and ensure the data is available to meet the needs of all users, systems, and functions.

The GFM DI initiative is divided into two tasks based on Joint Programming Guidance VII (June 29, 2006). Task One is to document department-wide authorization data in the Organizational and Force Structure Construct per DoDI 8260.03, and make the data available via Organizational (Org) Servers. Each Service, OSD, and the Joint Staff will have its own Org Server and associated IP. The goal of Task Two is to identify the resources necessary to associate the authorization data with on-hand data, enabling GVC.
There will be time allotted for questions and discussion.

Joint Munitions Effectiveness Manuals Weaponeering System 2.0 – JWS 2.0

AbstractID: 333

Ms. Jessica Stalnaker, USAF	Ms. Cameron McAllister, USAF	Mr. Greg Wilder, USAF
Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-883-5278 DSN: 875-5278 FAX: 850 882-9049 jessica.stalnaker@eglin.af.mil	Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-882-4342 DSN: 872-4342 FAX: 850-882-9049 cameron.mcallister@eglin.af.mil	Air Armament Center/671st Armament Systems Squadron 102 West D Avenue Eglin AFB,FL 32542-5499 850-882-3722 DSN: 872-3722 FAX: 850-882-9049 greg.wilder@eglin.af.mil

The Joint Munitions Effectiveness Manuals Weaponeering System (JWS) is the Tri-Service approved operational-level weaponeering tool. It calculates the effectiveness of a broad range of inventory weapon target combinations. Operational units are the main JWS user. However, it is also used directly and indirectly across the OR community. It is frequently the foundation of munition studies, including those that set inventory requirements and establish capability shortfalls. JWS development and maintenance is sponsored by the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME).

JWS 1.2 was released in August 2007. The main weapon-target effectiveness methodology in JWS 1.2 and previous versions is the JMEM Open-Ends Methods (OEMs). They were developed for MK-series munitions and provide an appropriate level of fidelity for determining the effectiveness of these munitions.

JWS 2.0 combines the air-to-surface and surface-to-surface weaponeering tools into one product. With this change and the move toward smaller and more accurate munitions, the OEMs no longer provided adequate fidelity. For this reason the main effectiveness methodologies for JWS 2.0 are the higher-fidelity methods found in the Joint Mean Area of Effects (JMAE) and Matrix Evaluator (ME) tools.

To introduce this new tool to the OR community, we will provide a summary of the methodologies changes as well as a demonstration of the software, including calculating effectiveness of several sample cases.

Actively Managing Air Fleet Lifetimes

AbstractID: 335

Maj. Michael Staples, USAF	Dr. Edward Robbins, USAF
AF/A9RI 1777 N Kent St. Arlington ,VA 22209 703-588-6985 Michael.R.Staples@pentagon.af.mil	AF/A9RI 1777 N Kent St. Arlington ,VA 22209 703-588-6919 Edward.Robbins.ctr@pentagon.af.mil

This analysis investigates how management of utilization rates can impact the cost and mission capabilities of aging aircraft fleets. Preserving these fleets raises issues related to operations and maintenance costs, reduced availability, and obsolete technologies. An interesting option is managing utilization rates. Reducing fleet sizes could allow more demanding flying programs to be placed on the remaining aircraft. This presentation describes the cost effectiveness and effect on mission capabilities of reducing fleet size while increasing crew ratios and flying hours on a fleet of aging aircraft.

Improved Methodology to Estimate Reimbursable Costs for Research and Technology

AbstractID: 138

Mr. Roger L Staso, USA
RDECOM, ECBC
E5183 Blackhawk Rd, ATTN: AMSRD-ECB-TDC (E3332)
Aberdeen Proving Ground,MD 21010-5424
410-436-5041
DSN: 584-5041
FAX: 410-612-5208
roger.staso@us.army.mil

Mr. Mark E Witkowski, USA
RDECOM, ECBC
5183 Blackhawk Rd, ATTN: AMSRD-ECB-TDC (E3332)
Aberdeen Proving Ground,MD 21010-5424
410-436-5035
DSN: 584-5035
FAX: 410-436-5037
mark.witkowski@us.army.mil

Prior to 1995, the Research and Technology Directorate at the Edgewood Chemical and Biological Center (ECBC), Aberdeen Proving Ground, MD obtained appropriated funds to conduct its mission. Gradually, the Directorate began to recover expenses by customer reimbursement via Test Service Agreements and Interagency Agreements. In effect, the Directorate had to begin operating like a business.

During this transition, the Directorate did not establish a standardized method to generate estimates to recover expenses. Directorate personnel generated estimates for services rendered individually and somewhat independently.

In 2003, the Directorate started to recover expenses entirely by customer reimbursement. It quickly became apparent that the methodology used to generate estimates for services rendered was woefully inadequate. Some teams forecasted, and subsequently experienced, shortfalls of over $1,000,000 in direct costs and indeterminable amounts in indirect costs. Thus began an in-house effort to identify costs that needed to be recovered and the collection of the data required to create an appropriate model for the generation of estimates.

In 2005, the ECBC Cost Analysis Team was approached by the Bio Defense Team within the Directorate to assist in generating a model to ensure that all costs (direct and indirect) are recovered. The effort resulted in a fully automated Excel workbook to generate an estimate that does so. Since the inception of the initial model in mid-2006, the Bio Defense Team is no longer experiencing shortfalls in direct and indirect costs.

In addition to the basic estimate, the workbook calculates Cost Recovery data to allow management to track status.

Recently, the model was modified to generate estimates for the Bio Sensors Team and it is anticipated that the remaining teams within this Directorate will adopt this methodology as well.

Enigma — a Rated Management Tool

AbstractID: 300

Maj. Jonathan Steckbeck, USAF
AF/A9RP
1777 N. Kent Street
Rosslyn,VA 22209
703-588-8290
Jonathan.Steckbeck@pentagon.af.mil

AF/A9, A1M and A3O developed a desktop decision support tool called ‘Enigma’ that allows senior-level decision makers to quickly examine the impacts and effectiveness of potential rated management policy decisions.

Through real-time analytic calculations, the Enigma tool demonstrates how carefully the Air Force must balance rated officer production with resource constraints in order to prevent degraded training and inadequate development of future generations of pilots, navigators and air battle managers. Enigma provides insight into required rated production numbers to sustain future rated force requirements.

This presentation and interactive model demonstration will highlight what differentiates Enigma from previous rated management tools. In seconds, the Enigma tool can consider how changes to any of the 5,000 input variables impact the rated management system inventories and requirements. Variables include aircraft inventory, crew ratios, experience mixes, initial rated inventories, rated officer production, aircraft aircraft standard utilization rates, experience requirements, continuation rate, and emerging staff requirements. Manipulating these variables allows for consideration of virtually any scenario. Enigma's results are of interest to offices which determine operational training requirements or schedule sorties.

Modeling Analysis Work Group (MAWG) for Unmanned Aerial Systems (UAS)

AbstractID: 357

COL Robert Steele, USA
TRADOC Analysis Center, Fort Leavenworth
255 Sedgwick Ave
Fort Leavenworth,KS 66027
913-684-9283
DSN: 552
FAX: 913-684-9151
robert.steele1@us.army.mil

Dr. Patrick Paradis, USA
TRADOC Analysis Center, White Sands Missile Range
ATTN: (ATRC-WSN)
White Sands Missile Range,NM 88002-5502
575-678-1763
patrick.paradis@us.army.mil

LTC Kaye McKinzie, USA
TRADOC Analysis Center, Fort Leavenworth
255 Sedgwick Ave
Fort Leavenworth,KS 66027
913-684-9131
kaye.mckinzie@us.army.mil

The growing number and variety of Unmanned Aerial Systems (UAS) in the Army has recently led to the development of new roles and tactics, techniques and procedures (TTPs). As a result, the TRADOC Analysis Center (TRAC) is striving to enhance the UAS representation in our models and simulations (M&S) to better support studies and analysis. To do so a Model Assessment Working Group (MAWG) was formed to

help determine the modeling implications of UAS across each of the three TRAC models: Assignment Scheduling Capability for Unmanned Aircraft Systems (ASC U), Advanced Warfighting Simulation (AWARS), and COMBAT XXI.

These three models are very distinct in their representation. ASC-U is a scheduling tool which does not represent attrition or threat forces. AWARS is a corps and division aggregate model often implementing 15 day scenarios. COMBAT XXI is a brigade and below model normally representing 18 hour scenarios. These vast differences in the models necessitated different modeling considerations for each new operational employment criteria. This presentation will focus on the initial stages of the MAWG effort where the changing role of UAS drove the development of core UAS model requirements for these specific models and the specific instantiation of those criteria in these different models.

Modeling and Simulation to Support Test and Evaluation of Chemical and Biological Defense Systems

AbstractID: 115

Dr. George E Steiger, USA
US Army Materiel Systems Analysis Activity
392 Hopkins Rd
APG,MD 21005
410-278-6442
DSN: 298-6442
FAX: 410-278-6865
george.steiger@us.army.mil

Dr. Thomas J Stadterman, USA
U.S. Army Materiel Systems Analysis Activity
392 Hopkins Rd
APG,MD 21005
410-278-6389
DSN: 298-6389
FAX: 410-278-6865
thomas.stadterman@us.army.mil

Mr. Carl M Eissner, USA
U.S. Army Materiel Systems Analysis Activity
392 Hopkins Rd
APG,MD 21005
410-278-6382
DSN: 298-6382
FAX: 410-278-6865
carl.eissner@us.army.mil

Mr. Charles Fromer, OSD
Joint Science and Technology Office, Defense Threat Reductio
8725 John J. Kingman Road
Ft. Belvior,VA 22060-6201
703-767-3299
DSN: 472-3299
FAX: 703-767-1892
charles.fromer@dtra.mil

Mr. Eric Lowenstein, OSD
Joint Science and Technology Office, Defense Threat Reductio
8725 John J. Kingman Road
Ft. Belvior,VA 22060-6201
703-767-3380
DSN: 472-3380
FAX: 703-767-1892
eric.lowenstein@dtra.mil

The test and evaluation (T&E) of chemical and biological defense (CBD) systems presents unique and significant challenges due to the constraints and restrictions on the use of actual agents, especially in the presence of Soldiers. Often, evaluations must employ broadly defined correlations based upon limited component testing with agents and operational testing using simulants. The results can be difficult to translate into operationally relevant terms given the multitude of factors that can apply at the system-level. The CBD T&E community recognizes the potential of modeling and simulation (M&S) to improve T&E of CBD systems, receiving substantial DOD investment over the past several years. Progress to date has been limited due to technical challenges, data gaps, and the lack of an integrated consensus strategy.

The U.S. Army Materiel Systems Analysis Activity recently conducted a study to assess the current DOD modeling and simulation tools and developmental efforts to support the test and evaluation of CBD systems. We present an overview of our study and our compilation of the M&S needs, gaps, and potential solutions for the CBD commodity areas. We also present a framework for a comprehensive, integrated M&S capability to provide CBD system performance and operational effectiveness data and analysis not readily available today due to testing and resource constraints.

Collaborative methods and technology for capturing SME assessments

AbstractID: 365

Mr. Lucas D Steinhauser, USAF
United States Strategic Command
6805 Pine St
Omaha,NE 68106
402-232-2074
DSN: 272-2074
steinhal@stratcom.mil

Subject matter experts are critical for providing many of the assumptions and raw data that feeds analytical models. Unfortunately, the best method to pull the tacit knowledge resident from these experts is not clear. This presentation will review collaboration methods and technology to capture tacit knowledge from subject matter experts. Examples from USSTRATCOM's Global Innovation and Strategy Center will illustrate the power and effectiveness of these methods which are enabled through collaborative technologies.

U.S. COAST GUARD UNMANNED WIDE AREA SURVEILLANCE

AbstractID: 28

LT Lee L Stenson, USCG
U.S. COAST GUARD (CG-7712, OFFICE OF REQUIREMENTS & ANALYSIS
2100 2nd St S.W. (suite 3604)
Washington,DC 20593
202-372-2524
Framar.L.Stenson@uscg.mil

LT Anthony Hawes, USCG
US Coast Guard (CCG-7613 C4IT Major Acquisitions Division)
2100 2nd Street S.W. (Suite 3604)
Washington,DC 20593
202-372-2524
FAX: 202-372-2910
Anthony.H.Hawes@uscg.mil

This paper addresses the potential area coverage of a U.S. Coast Guard cutter based unmanned aerial vehicle (UAV) and compares it to the H65C/MCH helicopter deployed aboard the National Security Cutter (WMSL). This model uses Spherical Geometry to look at area coverage and flight patterns. Spherical/elliptical geometry is used as it more closely approximates distances and area in the maritime operating environment. All operations for assets are based on the 2007 and 2025 Modeled Concept of operations(CONOP) for U.S. Coast Guard Deepwater assets. Considering the recent delays in getting a UAV for the WMSL class of cutters the Coast Guard is looking at potential losses in operational effectiveness and ways to fill the gap with other manned or unmanned aviation platforms. This paper also looks at the potential of a sattelite network to maintain area coverage of U.S. territorial waters and exclusive economic zone. The model and underlying analysis is strictly used to evaluate potential area coverage based on cutter availability and UAV tactics and does not give a prediction of operational effectiveness.

"That's what Bob said" - Improving Assumptions In IW Tools – A Case Study

AbstractID: 223

Dr. James G Stevens, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington,VA 22202
703-699-1702
DSN: 499-1702
FAX: 703-601-0357
james.stevens@osd.mil

Ms. Danielle Miller, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington,VA 22202
703-699-1714
DSN: 499-1714
FAX: 703-601-0357
danielle.miller.ctr@osd.mil

Modeling and simulation (M&S) tools to support analysis of irregular warfare – under the rubrics of stability operations or DIME/PMESII, to name a few – are being developed across the Department of Defense (DoD) and industry. Many assumptions being used as the basis of these tools are bounded more by antidotal evidence and personal experience than by historical analysis, prevailing theories, and empirical evidence. These are not new critiques to DoD – in fact, two well-regarded papers (Paul Davis and Donald Blumenthal's "The Base of Sand Problem: A white paper on the state of military combat modeling" and James S. Hodges and James A. Dewar's "Is it You or Your Model Talking? A framework for model validation") address many similar issues for the kinetic-based M&S tools that are in use today. This presentation will review many M&S tools to support analysis of irregular warfare and, using above mentioned papers as a basis, conduct a case study of one of the tools, Peace Support Operations Model (PSOM).

PSOM, under joint development by the Defence Science and Technology Laboratory in the United Kingdom, Joint Staff/J8, and OSD/Program Analysis and Evaluation, is a time-stepped computer assisted wargame. It attempts to capture all aspects of national power including interagency and non-governmental players. PSOM also includes the population and their reactions to operations in their region.

Recapitalization of Strategic Sealift and Maritime Preposition Force Analysis

AbstractID: 16

CAPT James T Stewart, USN
OPNAV N421
Crystal Square 2, Suite 1002
Arlington,VA 22202
703-602-7135
DSN: 332-7135
FAX: 703-602-7326
james.t.stewart@navy.mil

Sealift Summits in 2006 and 2007 provided forums for major decisions to be made/endorsed by Commander, US Transportation Command on Sealift Recapitalization. This brief will present the analysis that OPNAV N42 conducted and then presented at the summits that led to major decisions on sealift, including ship retirements, extensions, and planned replacements. Of particular interest is the analysis conducted to determine which ships had the most/least value for retention in the Ready Reserve Fleet and the analysis on when to start a new sealift building program. The envisioned analysis and strategy for updating the make-up of the Maritime Preposition Force squadrons will also be discussed.

Measuring the Impact of a Force Generation Policies on Force Size

AbstractID: 23

LTC Steve Stoddard, USA
OSD PA&E Land Forces
1800 Defense Pentagon
Washington,DC 20301
703-697-6408
DSN: 227-6408
FAX: 703-697-6408
steven.stoddard@us.army.mil

The Department of Defense continually wrestles with questions of force size and rotation / readiness policies. To analyze courses of action, we employ a frontier that couples contingency operations (no rotation required) and enduring operations (units rotate periodically) while giving full consideration to a service's force generation process.

A service's capacity to meet rotational requirements is a function of its force size and rotation policy. Its contingency capacity is a function of its force size and readiness policy. This research uses a frontier that shows the feasibility of combinations of enduring activities and contingency events, under various force generation and readiness policies. The frontiers allow for assessment force size, force generation process (in terms of readiness), and of the full range of potential enduring activity and contingency event combinations.

Each frontier is a graph of supply capacity, in that the frontier is constant for any force size and force generation / readiness policy. While the frontier is formulated based on a wide spectrum of demand scenarios, it does not shift in response to any single demand scenario. The frontier indicates whether a given demand scenario is within a given force structure's capacity to supply forces under the force generation process, and if so, at what level of rotational stress. To analyze alternative force generation and readiness policies, we create corresponding frontiers and compare the differences.

Developing An Excel Decision Support System Using In-Transit Visibility To Decrease DoD Transportation Delays

AbstractID: 54

Capt. Brian B Stone, USAF
Air Force Institute of Technology
7845 Timber Hill Dr
Dayton,OH 45424
850-582-2123
brian.stone@afit.edu

Mr. James T Moore, USAF
AFIT/ENS
2950 Hobson Way
WPAFB,OH 45433
937-255-3636x4528
DSN: 785-3636x4528
FAX: 937-656-4943
James.Moore@afit.edu

Lt Col Pamela S Donovan, USAF
AFIT
2950 Hobson Way
WPAFB,OH 45433
937-255-3636x4510
DSN: 785-3636
FAX: 937-656-4943
Pamela.Donovan@afit.edu

The United States Air Force's Air Mobility Command is responsible for assigning cargo aircraft and aircrews to delivery routes in order to transport military personnel and palletized cargo throughout the world. As a pallet of cargo is transported through the network, it is either waiting at an airport to be loaded or it is in some phase of the loading, transportation, or unloading process. The time spent in these conditions make up the total time required to deliver a pallet of cargo to its destination. The loading and unloading process has been streamlined throughout the Global War on Terror to a point which leaves little room for improvement. However, decreasing the average time pallets wait for a transportation aircraft, called the port hold time, is a difficult problem which is currently receiving attention. The Air Force has invested in radio frequency identification (RFID) technology to provide in-transit visibility (ITV) of all cargo moving through the transportation network. In many ways, ITV has made cargo transportation much more efficient but its use in measuring and characterizing cargo flow through the network has not been fully exploited. The purpose of this research is to determine if information about the below average performance of subsets of the transportation network in the Iraqi theater, heretofore obscured by broader metrics, can be brought to light by leveraging RFID data at the pallet level. This drill down perspective highlights specific areas of the network which may be causing lengthy cargo delays and are targets for improvement. A Microsoft Excel application is developed to utilize RFID data as input to calculate sub network port hold time statistics over a specified period of time. The data is analyzed using Statistical Process Control (SPC) methods and displayed using control and Pareto charts.

MORS Irregular Warfare Workshop, "Improving Cooperation Among Nations in Irregular Warfare Analysis"

AbstractID: 108

Dr. Al Sweetser, OSD
OSD PA&E Simulation & Analysis Center
1401 Wilson Blvd., Suite 300
Arlington,VA 22209
703-696-9370
DSN: 226-0370
FAX: 703-6969394
wilmer.sweetser@osd.mil

Dr. Karsten Engelmann, USA
Center for Army Analysis
6001 Goethals Rd
Ft. Belvoir,VA 22060
703-806-5532
karsten.engelmann@us.army.mil

This presentation will review the MORS workshop, "Improving Cooperation among Nations in Irregular Warfare" (IW Workshop) at the Naval Postgraduate School (NPS) in Monterey California, December 11-13 2007. This event provided an opportunity for a comprehensive assessment of IW data, tools, and analysis. Attendance at the conference totaled 165 participants, including twenty NPS students and faculty, and forty international representatives from twenty-one countries. The purpose of this workshop was to enhance collaboration and improve analysis of IW among U.S., ally and partner military and interagency analysts. Many Allies and partners have rich histories in IW operations. Some have developed analytical tools and techniques to address operational issues. The IW Workshop was the first MORS workshop that

focused on broad international participation as a means of increasing the transfer of information and know how among allies and coalition partners. A second focus of the workshop was on the use of analytically-supported wargames. This emphasis recognizes that the analytical community is a long way from having rigorous models to assess IW. In the near term, we may be better able to assist senior leaders by providing analytical support to wargames that enlist the support of subject matter experts (SMEs). This approach marries the operational experience of SMEs with the tools and methods of operations research. Analytically-supported wargames offer a means to improve decision making in the near term while the analytical community builds the data, tools, and methods needed for more rigorous methods. At the IW Workshop, participants had the opportunity to participate in analytically supported wargames with operators and subject matter experts in the areas of counterinsurgency (COIN) and stability operations.

A tool for the Analysis of the Army's Future Aviation and Ground Combat Systems

AbstractID: 464

Mr. Scott R Swinsick
The Boeing Company
5000 E. McDowell Rd. M531-C240
Mesa,AZ 85215-9797
480-891-8429
FAX: 480-891-6542
scott.swinsick@boeing.com

Mr. Rupert L Seals
The Boeing Company
P.O. BOX 16858
Philadelphia,PA 19142
610-591-3092
FAX: 610-591-5636
rupert.l.seals@boeing.com

This paper will discuss a battlespace simulation model that has been developed by The Boeing Company for the U.S. Army. The Advanced Tactical Combat Model (ATCOM), a stochastic, force-on-force, combat simulation model, examines rotorcraft, ground vehicles, fixed wing aircraft, and their associated systems. ATCOM evaluates interactions between opposing forces, simulated over a three-dimensional digital terrain database, and considers weapon and sensor performance, combat vehicle characteristics, and tactics. ATCOM can run in batch mode, using Monte Carlo techniques to produce multiple replications of an experiment for statistical analysis, or interactive mode, to allow players direct involvement with the combat encounter. The model provides a two-dimensional plan view of the battlefield with graphics depicting combat entity positions and motion, sensor and weapons interactions, and battle effects.

The development history of ATCOM and its current validation and verification status will be presented. ATCOM is being distributed in cooperation with AMSAA as the model of choice for evaluating rotary wing aircraft and their interactions with the ground combat environment. ATCOM was developed in the early 1980's and began maturing in 1995 when the Directorate of Training, Doctrine, and Simulation (DODTS) and the Air Maneuver Battlelab (AMBL) at Fort Rucker were seeking a model to accurately simulate the RAH-66 Comanche Reconnaissance Attack Helicopter. The model has continued to evolve through Boeing Independent Research and Development activities and is in use at six U.S. Army sites, six Boeing sites, and three international sites. ATCOM has been used on numerous Contract Research and Development activities as both a constructive and interactive simulation environment in support of Boeing customers.

ATCOM has been used as an analysis, modeling, simulation, and experimentation tool on programs such as the U.S. Army's Hunter-Killer Stand-off Team (HSKT), Apache Block III (AB3), Joint Heavy Lift (JHL), and the U.K. Future Rapid Effects System (FRES). Study approaches, the technologies modeled, and representative metrics for examining trade studies related to Army Aviation and Ground Combat will be presented. Results will be shown for Apache Block III and the FRES program to compare and contrast Aviation and Ground Vehicle technology trade-off studies.

Regional Strategic Intelligence Assessments

AbstractID: 325

Capt. John Syphrit, USAF
AF/A9AO
1777 N Kent Street
Rosslyn,VA 22209
703-588-8284
John.Syphrit@pentagon.af.mil

Mr. John Borsi, USAF
AF/A9A
1777 N Kent Street
Rosslyn,VA 22209
703-588-8198
John.Borsi@pentagon.af.mil

Regional Strategic Intelligence Assessments provide an overview of potential areas of conflict (terrorism levels and other regional stability factors) and attempt to demonstrate which regions and states require more attention and resources from the USG. These assessments will inform better resource allocation decisions and possibly head-off or limit more dangerous conflicts in the future. Example assessments will be presented and audience support will be solicited to develop and refine important factors to be considered in the assessments.

DoD Analytic Agenda and JDS

AbstractID: 229

Lt. Col. Michael "Kent" Taylor, USAF
OSD(PA&E)/Joint Data Support
2521 South Clark Street
Arlington,VA 22202
703-699-1703 DSN: 499-1703
FAX: 703-601-0357
michael.taylor@osd.mil

This briefing is an overview of the DoD Analytic Agenda and roles and responsibilities of OSD/PA&E Joint Data Support. The DoD Analytic Agenda is the DoD framework for conducting strategic analyses supporting planning, programming, and acquisition efforts. Joint Data Support

(JDS), under the administration of the Office of the Secretary of Defense (Program Analysis and Evaluation), collaborates with OSD (Policy) and the Joint Staff in the development and management of data, tools, and analytical baselines supporting strategic analyses conducted by the Department of Defense.

This briefing is an overview of the origins and current status of the DoD Analytic Agenda and highlights organizational contributions to managing and executing the Analytic Agenda. The briefing highlights challenges to improving visibility, accessibility, and traceability in the development of common data, tools, and methods for the DoD Strategic Analysis Community and describes DoD-wide initiatives that will address these challenges. The briefing also highlights JDS' evolving role in the DoD Analytic Agenda.

There will be time allotted for questions and discussion

Unmanned Aerial Systems with Self Organizing Behaviors

AbstractID: 506

MAJ Edward Teague, USA
Dept of Systems Engineering, USMA
3134C Radiere Loop
West Point,NY 10996
845-938-5661
edward.teague@usma.edu

Unmanned Aerial Systems (UAS) are entrenched as an integral part of strategic and tactical operations throughout the Department of Defense and other government agencies. In this time of emerging doctrine and rapid advances in technology, the breadth of mission profiles continues to expand. They are only limited by imagination and resource allocation.

One way to increase efficiency of unmanned systems is to reduce the workload of its operators during missions. Within a few years, one ground control station will have the ability to control up to four Unmanned Aerial Vehicles (UAVs). I propose another step forward.

Like the swarms of some insects, semi autonomous UAVs can collaborate using simple rule sets. These rules sets when dynamically joined with mission specific tasks provide the foundation for a self-organizing set of UAVs. These UAVs, tapping into the FCS C2 network, receive orders from a control station but organize and execute their tasks with minimal human in the loop input.

The self-organizing UAS architecture offer several advantages. It reduces the workload on the ground control station by limiting tedious tasks for the UAV controller. It may also reduce workloads for the payload operator as well. In addition, the mission tasks can be driven directly by the unit or personnel requiring UAS support for a particular mission. This limits "losses in translation" and provides a shorter implementation time more directly empowering those that are supported.

A system design to achieve this functionality is presented. It addresses the UAS architecture, rule sets, algorithms, communication, and bandwidth issues. Recommended rule sets are validated through simulation and analysis.

Dazzzed! Headshot, clarity: Sentinel measures for planning and programming the future of Space

AbstractID: 454

Mr. Mike A Tedeschi, USAF
AFSPC/A9
250 South Peterson Blvd
Peterson AFB,CO 80914
719-554-8107
DSN: 692-8107
FAX: 719-556-3738
michael.tedeschi@peterson.af.mil

Mr. Steve J Wichmann, USAF
AFSPC/A9
250 South Peterson Blvd
Peterson AFB,CO 80914
719-554-2473
DSN: 692-2473
FAX: 719-556-3738
stephen.wichmann@peterson.af.mil

Boss was "losing track". Our wonderful presentation of space system cost, schedule and performance was not holding his attention. It came to us like a head shot, we were overcomplicating our analysis. Space Planning and Programming is supported by Multi Objective Decision Analysis and Math Programming. This equates to exciting days for the analysts but translates to more data than a decision maker can or wants to absorb. The fix proposed to us was to condense the Value model down from 300 measures to 19 "sentinel" measures. This discussion focuses on our initial study of the 300 measures contribution to the decision then describes the efforts to develop a compact number of measures that are underpinned by Space and Missile Commands modeling efforts. Our overall goal is to develop a more agile, precise, presentable and accurate Integrated Planning Process.

Irregular Warfare Modeling: A Survey of Agent-Based Modeling Tools

AbstractID: 493

Mr. James A Thomas, USN
Naval Surface Warfare Center Dahlgren
5370 Marple Road Suite 109
Dahlgren,VA 22488
540-653-8090
DSN: 249-8090
FAX: 540-653-8286
james.a.thomas@navy.mil

Mr. Scott Soderlund, USN
Naval Surface Warfare Center Dahlgren
5370 Marple Road Suite 109
Dahlgren,VA 22488
540-653-1947
scott.soderlund@navy.mil

The Naval Surface Warfare Center Dahlgren recently conducted a survey of both general and domain-specific agent-based modeling tools that could potentially support analysis for Irregular Warfare (IW). From numerous initial candidates, thirty-one tools were selected for a quick assessment. These tools fall into several categories:

• General modeling platforms, which could be used to model IW systems
• Domain-specific tools that directly support aspects of IW analysis
• Open source tools, from which selected capabilities may be leveraged in IW-specific tools

The tools included in the survey span Commercial Off-The-Shelf (COTS), Government Off-The-Shelf (GOTS), open source, free and proprietary tools.

This presentation will discuss the motivation, purpose, guidelines and results of this initial survey, highlighting tools that are potentially useful. It is believed that the results will prove quite useful to the MORS community, both in the area of Irregular Warfare and in other military domains, as a starting point for tool selection.

Prior Service Market Research Study

AbstractID: 543

MAJ Brian A Thomas, USA
Army Reserve Command G1
1401 Deshler Street
Fort McPherson,GA 30330
404-464-9099
Brian.thomas3@us.army.mil

PROBLEM STATEMENT: What does the prior service market look like? USARC G1 will define the market in 3 major ways: demographically, geographically and psychographically. There are essentially two prior service (PS) market pools: Active and Reserve. USAREC Regular Army Recruiters can recruit any prior service soldier (with military service obligation or not) as long as he/she meets the enlistment standards. The source data from the majority of the active duty PS applicants comes from the Total Army Personnel Data Base- Reserve (TAPDB-R). USAREC Army Reserve recruiters can only recruit those without a remaining service obligation (Civil Life Gains or CLG). The PS CLGs list source comes from DMDC and they keep PS soldier data on file for 5 years after their expiration term of military service.

RESEARCH REVIEW: A review of the literature indicates that similar research on the subject in January and July 2002. HQ USARC G1 would like to conduct a survey that covers Regular Army and Army Reserve PS applicants. This study would expand and build upon the two previous studies and provide more in-depth analysis to further define the PS recruiting market. The two previous studies were; “Prior Service Qualitative Research”, January 2002, L. Presthus & Associates and “United States Army Reserve (USAR) Prior Service Survey”, M. Davis and Company, Inc., July 2002.

PURPOSE AND EXPECTED RESULTS:
Phase I. Primary Focus; Quantify the demographics, geographic and psychographics of the PS population as defined by USAREC. Provide a full perspective of the size, location and characteristics of the population. Examine the available pool of prior service personnel with regard to total numbers and quality (i.e. education level, mental category and characterization of service etc.). This prior service population study should begin with analysis of the pool of personnel available.

Operations Research in the Counter-IED fight.

AbstractID: 129

Capt Anastasios Tsoutis, USMC
Operations Analysis Division, MCCDC
3300 Russell Road, Building 3300
Quantico,VA 22134
703-784-6048
ttsoutis@yahoo.com

The author served as the Operations Research Systems Analyst (ORSA) in the Counter Improvised Explosive Device (CIED) cell, Multi National Force-West. The presentation provides examples of how quantitative methods enhanced the analytical capability of the CIED cell. Topics covered include the implementation of the ArcGIS geospatial software, data management and data analysis.

A Hybrid Composite Classification System operating on HRR Signatures Derived from SAR images of ground targets

AbstractID: 116

Capt. Michael A Turnbaugh, USAF
AFIT/ENS
2950 Hobson Way
WPAFB,OH 45433-7765
937-255-6565x4361
DSN: 785-6565x4361
FAX: 937-656-7642
michael.turnbaugh@afit.edu

Dr. Kenneth W Bauer
AFIT/ENS
2950 Hobson Way
WPAFB,OH 45433-7765
937-255-3636x4328
DSN: 785-3636x4328
kenneth.bauer@afit.edu

An automatic target classification system contains a classifier that maps a vector of real numbered features characteristic to a specific target onto a class label. Other features can be non-numeric, such as a string of symbols or alphabets. We propose a design for a hybrid composite classification system, which exploits both real numbered and non-numeric features with a template matching classification scheme. This composite classification system is made up of two independent classification systems. The first classifier uses non-numeric features, similar to those found in syntactic pattern recognition, by exploiting the overall structure of the patterns themselves.

The second method uses a more classical feature vector method that bins the patterns and uses the maximum amplitude within each bin in developing the feature vector for each pattern. By using these two separate approaches, we explore conditions that allow the two techniques to be complementary in nature, thus improving the overall performance of the classification system. We examine various fusion techniques, in search of the fusion technique that brings us the best results. We investigate different parameter spaces and fusion rules on example problems to demonstrate our classification system. Our examples consider various application areas to help further demonstrate the utility of our classifier.

Evaluation of Urban Atmospheric Transport and Dispersion Models Using Data from the Joint Urban 2003 Field Experiment

AbstractID: 285

Dr. Jeffry T Urban
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311-1882
703-578-2854
jurban@ida.org

Dr. Steve Warner
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311-1882
703-845-2096
swarner@ida.org

Dr. Nathan Platt
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311-1882
703-845-2267
nplatt@ida.org

Dr. James F Heagy
Institute for Defense Analyses
4850 Mark Center Drive
Alexandria,VA 22311-1882
703-578-2854
jheagy@ida.org

The Institute for Defense Analyses has for several years studied models used to predict the atmospheric transport and dispersion (T&D) of releases of hazardous materials. Much of our recent work has focused on assessments of models used to predict transport and dispersion in urban areas – an environment of particular concern, and one that presents its own unique modeling challenges. We have evaluated the performance of several urban T&D models by comparing model predictions to tracer gas concentrations measured during urban field experiments. Most recently, we have focused on comparisons to data from Joint Urban 2003 (JU03), a comprehensive and heavily-instrumented interagency field experiment conducted in Oklahoma City (OKC) in the summer of 2003.

We studied the following models: the several urban T&D models in the HPAC modeling suite developed by the Defense Threat Reduction Agency, the MESO/RUSTIC models developed by ITT Industries, and the QUIC-URB/QUIC-PLUME models developed by Los Alamos National Laboratory. Working within the constraints of the various models, a protocol was developed that permitted the head-to-head comparison of the most promising urban models within HPAC to MESO/RUSTIC and the QUIC models. These models were used to generate one-hour predictions of transport and dispersion in the OKC central business district for the twenty-nine thirty-minute continuous releases of sulfur hexafluoride tracer gas in the JU03 experiment. Two meteorological inputs were used to drive the predictions: a single-altitude rooftop wind measurement and a SODAR vertical wind profile from instrument sites upwind from the tracer release sites. A number of metrics were used to assess model performance, including a comparison of contour plots of predicted and observed tracer concentrations, and statistical measures of performance based on a paired-in-space-and-time comparison of predictions and observations. Non-parametric hypothesis testing was used to check for significant statistical differences in model performance.

This presentation summarizes our evaluation of the relative performance of the different urban T&D models using JU03 data. We also attempt to characterize some of the features and limitations of the urban models, as well other factors such as the effects of differing meteorological conditions on prediction quality.

Modeling Mass Dispensing of Prophylaxis using LPAT

AbstractID: 91

Dr. Charles N Van Groningen
Argonne National Laboratory
9700 S Cass Ave
Argonne,IL 60439
630-252-5308 FAX: 630-252-6073
vang@anl.gov

Mr. Paul Jr. L Hewett
Argonne National Laboratory
9700 S Cass Ave
Argonne,IL 60439
410-420-0133
plhewett@anl.gov

The Logistics Process and Analysis Tool (LPAT) is a combination of proven tools for analyzing macro- and micro- transportation and

distribution processes. This tool has been used to analyze the process of dispensing prophylaxis to large populations from “warehouse to individual” in short periods of time. This presentation will give an overview of the LPAT and its underlying models (The Logistics Intra-theater Support Tool – ELIST and the Process Analysis Tool – PAT), provide an overview of some scenarios this has been applied to – Cities Readiness Initiative and pandemic flu outbreak, and finally provide some future development and application of the models.

Nodal Model integration with ELIST and evaluation of NoMaDD

AbstractID: 94

Dr. Charles N Van Groningen Argonne National Laboratory 9700 S Cass Ave Argonne,IL 60439 630-252-5308 FAX: 630-252-6073 vang@anl.gov	**Mr. Steve Sommer** Joint Deployment Process and Analysis Center, USTRANSCOM 709 Ward Dr., Bldg. 1990 Scott AFB,IL 62225 618-220-5136 Steve.Sommer.ctr@ustranscom.mil

A new Nodal Model functionality has been integrated into ELIST (The Enhanced Logistics Intra-theater Support Tool). This model shows great promise for allowing analysts to evaluate configurations and process flows within the transportation process. This presentation will give an overview of the nodal model, describe how it has been incorporated into ELIST, provide a summary of its application to Node Management and Deployable Depots (NoMaDDs), and give a summary of how it could be applied to other areas.

An Extended Area Protective System (EAPS) Baseline Interceptor System Effectiveness Analysis

AbstractID: 52

Mr. Robert H Vasse U.S. Army AMRDEC Bldg 5400 Redstone Arsenal,AL 35808 256-313-8156 FAX: 256 876 9025 robert.vasse@us.army.mil	**Mr. David F Whitten** U.S. Army AMRDEC Bldg 5400 Redstone Arsenal,AL 35808 256-876-3081 FAX: 256-876-9025 david.f.whitten@us.army.mil

The U.S. Army's Aviation and Missile Research, Development, and Engineering Center (AMRDEC) is conducting research on baseline interceptors to guard Joint forces against attack by rockets, artillery, and mortars (RAM). An interceptor system that could engage, intercept and defeat inbound RAM would enhance force protection for the ground commander, reduce his casualties and safeguard his materiel. The “Extended Area Protective System (EAPS) Baseline Interceptor Effectiveness Analysis” used a government owned engagement level warfighting simulation, IDEEAS, to examine relative capabilities of two conceptual EAPS systems of systems vs. threat RAM. Credible, high fidelity representations of surveillance and fire control radars were coupled to 5 degree of freedom (5 DOF) friendly missiles and guns through a multi node command and control net; all interceptor munitions were flown to point of closest approach against 5 DOF multiple caliber, simultaneous, inbound RAM. Based on a credible military vignette, the numerical and visual results describe the what and why of the two systems' effectiveness in terms of numbers of acquisitions, numbers of interceptors flown, interception ranges, locations and numbers of successful and unsuccessful interceptions.

Developing Action Plans to Mitigate Cyber Threats

AbstractID: 473

Ms. Heidi S Vecera Department of Defense 9800 Savage Rd, Suite 6329 Fort Meade,MD 20755 240-373-1777 FAX: 240-373-1788 hssavin@nsa.gov	**Dr. Christopher Degni** Science Applications International Corporation (SAIC) 7120 Columbia Gateway Drive Columbia,MD 21046 410-312-3756 FAX: 410-872-1355 degnic@saic.com

Decision makers are often faced with a set of actions that can be taken to mitigate cyber threats. Each individual action has a cost, benefit and risk associated with it. An action plan consists of a set of actions that when performed together should reduce the threat. Due to the interdependence of actions, determining the cost, benefit and risk associated with an action plan is not as simple as adding the individual components. The problem space in inherently ambiguous and generating feasible (let alone near-optimal) action plans is quite challenging.

A methodology and process are currently being developed to generate action plans to mitigate cyber threats. The methodology is still a work-in-progress, and suggestions and feedback are welcome, especially on similar efforts that may be ongoing.

A Draft Methodology for Collateral Effects Estimation

AbstractID: 479

Ms. Heidi S Vecera	**Dr. Christopher Degni**
Department of Defense	Science Applications International Corporation (SAIC)
9800 Savage Rd, Suite 6329	7120 Columbia Gateway Drive
Fort Meade,MD 20755	Columbia,MD 21046
240-373-1777	410-312-3756
FAX: 240-373-1788	FAX: 410-872-1355
hssavin@nsa.gov	degnic@saic.com

Collateral damage estimation is a methodology to predict the level of unintended damage that occurs beyond direct damage to the target during a military operation. Translating this concept to computer network operations (CNO) is difficult, since the effects of a CNO are much more unpredictable (and potentially much more widespread) than those of a kinetic weapon. An underlying framework has been developed for a collateral effects estimation methodology that can be used in the case of a CNO.

The methodology first uses a tool-target environment pairing to scope the potential effects. In those cases where the potential effects exceed a given threshold, the methodology calls for a more detailed analysis of those effects. To use such a methodology, it is necessary to characterize the target environment and to develop facilitation materials to allow commanders and other decision makers to perform this characterization themselves without special help from an outside subject matter expert.

This methodology is very much a work in progress. The current framework will be presented and comments and suggestion are welcomed, as well as references to any similar work that may also be currently ongoing.

Developing and Modeling Rule Sets to Defend Networks

AbstractID: 480

Ms. Heidi S Vecera	**Ms. Meghan Callahan**
Department of Defense	Science Applications International Corporation (SAIC)
9800 Savage Rd, Suite 6329	7120 Columbia Gateway Drive
Fort Meade,MD 20755	Columbia,MD 21046
240-373-1777	410-872-2726
FAX: 240-373-1788	FAX: 410-872-1355
hssavin@nsa.gov	meghan.k.callahan@saic.com

In an environment where the scale of threat identification and mitigation is ever-increasing, rule set development has been identified as a force multiplier for operations and analytic personnel to enable appropriate response to hostile activity. To deploy such a response capability, an evolving set of actions must be created to properly mitigate each set of malicious activity. However, determining the behavior and effectiveness of those rule sets remains a challenge. By modeling rule-based systems, we can create a baseline to predict their future evolution, allowing ongoing response to hostile activity.

The presentation will consist of a discussion of the modeling techniques and mathematical algorithms prototyped and a discussion of the impact and implications of this type of effort.

Improvised Explosive Devices in Iraq: Injury Patterns, Severity, and Outcomes

AbstractID: 306

Ms. Amber L Wade	**Mr. Michael R Galarneau**
Science Applications International Corporation	Naval Health Research Center
140 Sylvester Road	140 Sylvester Road
San Diego,CA 92106	San Diego,CA 92106
619-553-7026	619-553-8411
amber.wade@med.navy.mil	michael.galarneau@med.navy.mil

Improvised explosive devices, or IEDs, are responsible for nearly 50% of all U.S. combat casualties in Iraq (both killed and wounded) and are a primary cause of traumatic brain injury (TBI), the so-called “signature wound” in the Global War on Terrorism. This presentation will describe IED injury patterns from Operation Iraqi Freedom and discuss patient characteristics associated with IED injuries such as military occupational specialty, personal protective equipment, and disposition as documented by the Navy-Marine Corps Combat Trauma Registry (N-MC CTR) Deployment Health Database.

The N-MC CTR database consists of combat casualty medical records (as well as non-combat injury and disease records) collected from multiple levels of care for each patient, starting at medical treatment facilities near the point of injury and continuing through long-term rehabilitative care (if necessary). Patients returned to duty from forward-deployed medical facilities are also included. Although these patients have historically been excluded from combat casualty data collection and analysis, they account for approximately 40% of IED casualties in the N-MC CTR database and are an important source of IED-related morbidity as many present with minor TBI.

This presentation will also provide an overview of additional findings from related studies performed at Naval Health Research Center, to include the Surface Wound Mapping (SWM) Analysis Tool (SWAT) which graphically demonstrates aggregated anatomical injury location (injury density) and severity.

Predicting Software Costs

AbstractID: 361

Ms. Corinne C Wallshein, USAF
Air Force Cost Analysis Agency
201 12th Street, Suite 403
Arlington,VA 22202
703-602-9282
DSN: 332-9282
FAX: 703-604-0422
corinne.wallshein@pentagon.af.mil

Predicting software costs for software-intensive major defense acquisition programs (MDAP) while the requirements, size, and budget are hazy is a challenge. Experts have labored with this conundrum and have graced the community over the past three decades with reasoned conclusions and tools. Tools such as COCOMO, SLIM, SEER-SEM, ACEIT, and PRICE are staples for software cost estimation. With MDAP submissions in Defense Cost and Resource Center's software reports database, the military cost analysis community has an official data source of software requirements, size, Software Engineering Institute's Capability Maturity Model Integrated (CMMI) ratings, commercial-off-the-shelf (COTS) components, and hours. The presentation graphically depicts relationships among the reported CMMI levels, hours, productivity rates, requirements, code size, development process types, and peak staffs using the 'R' project language and environment for statistical data exploration. Statistical analyses evaluate cost estimating relationships, with total number of hours as a proxy for cost.

Modeling the Effects of Maintenance Capabilities on Aircraft Operations

AbstractID: 67

Maj. Jennifer G Walston, USAF
Air Force Logistics Management Agency
501 Ward St
Maxwell AFB, Gunter Annex,AL 36114-3236
334-416-4088
DSN: 596-4088
FAX: 334-416-3766
jennifer.walston@maxwell.af.mil

Maj. Anthony F Antoline, USAF
Air Force Logistics Management Agency
501 Ward St
Maxwell AFB, Gunter Annex,AL 36114-3236
334-416-5807
DSN: 596-5807
Anthony.Antoline@maxwell.af.mil

Capt. Scotty A Pendley, USAF
Air Force Logistics Management Agency
501 Ward St
Maxwell AFB, Gunter Annex,AL 36114-3236
334-416-3602
DSN: 596-3602
Scotty.Pendley@maxwell.af.mil

1st. Lt Frank A Iubelt, USAF
Air Force Logistics Management Agency
501 Ward St
Maxwell AFB, Gunter Annex,AL 36114-3236
334-416-1886
DSN: 596-1886
Frank.Iubelt@maxwell.af.mil

Air Mobility Command (AMC) employs the Aircrew/Aircraft Tasking System (AATS), which is designed to balance AMC aircrew and aircraft allocations against operational and training requirements, but currently does not take into account maintenance capabilities based on available manpower or skill level. This study proposes modifications to AATS to account for maintenance manpower capability using the Net Effective Personnel (NEP) metric. NEP quantifies effectiveness and availability of aircraft maintenance personnel based on availability, skill level, and time personnel are occupied due to required ancillary training. Thus, rather than simply using ratio of assigned to authorized personnel as is typically done, NEP more accurately estimates the "effective" capacity of the resource pool. The study also uses discrete-event simulation of flight and maintenance operations at a base to study the effects of the new methodology on operational measures like mission capable rate and aircraft availability, validates the use of the NEP metric to quantify maintenance capability, and conducts a sensitivity analysis for how skill level mix and manning rates affect the operational metrics.

Use of Multi-Criteria Decision Making for Selecting Chemical Agent Simulants for Testing

AbstractID: 147

Mr. John Walther, USA
ECBC
5183 Blackhawk Rd
APG,MD 21010
410-436-3569
DSN: 584-3569
FAX: 410-436-4894
john.walther@us.army.mil

Ms. Lindsey Wurster, USA
ECBC
5183 Blackhawk Rd
APG,MD 21010
410-436-8683
DSN: 584-8683
FAX: 410-436-4894
lindsey.wurster@us.army.mil

Ms. Shawn Bowen, USA
ECBC
5183 Blackhawk Rd
APG,MD 21010
410-436-1268
DSN: 584-1268
FAX: 410-436-4894
shawn.e.bowen@us.army.mil

Testing is a key element in developing and fielding military equipment. For chemical defensive equipment such as collective protective systems, detectors, and decontaminants, one important type of testing is the evaluation of equipment performance against chemical, biological, radiological, or nuclear agents. However, testing with actual agents is often not practical or feasible due to safety, surety, cost, schedule, environmental, or other limitations. In these situations, simulants are used to provide information on the performance of the equipment. Selection of appropriate simulants is critical to ensure the collection of applicable data that can be used to infer performance against the actual agent.

Despite the importance of this issue, there has never been an accepted and standardized process for selecting agent simulants. In 2006, a

research project was initiated to develop and test a process to select chemical simulants for collective protection applications. The project team, which included chemical and testing experts from various organizations, developed a seven step process. The process starts with framing the problem, to identify the specific application and type of testing for which a simulant will be selected. Next, candidate simulants are identified and then screened to a reasonable number for evaluation using threshold criteria. Data are collected on the remaining candidate simulants and a detailed evaluation is conducted, resulting in selection of simulants to undergo verification testing.

At the core of the process is a decision analysis methodology called Multi-Criteria Decision Making. This methodology involves identifying and defining evaluation criteria, including both physical and chemical properties that must resemble the agent, and usability parameters. A performance scale is also developed for each criterion, and the criteria are prioritized (weighted). Each candidate simulant is assessed relative to the criteria, and a linear additive method is used to generate overall scores for each simulant. Various types of analysis, to include sensitivity analysis, are performed to generate a set of recommended simulants for the application under consideration.

The process and evaluation model are tailorable to meet the requirements of various applications and types of equipment, and for any type of testing.

Automating Forecasting and Exploration of Complex Simulation Effects

AbstractID: 237

Ms. Janet Wedgwood
Lockheed Martin Advanced Technology Laboratories
3 Executive Campus, 6th Floor
Cherry Hill,PA 08002
856-792-9879
FAX: 856-792-9930
jwedgwoo@atl.lmco.com

Mr. Zach Horiatis
Lockheed Martin Advanced Technology Laboratories
3 Executive Campus, 6th Floor
Cherry Hill,PA 08002
856-792-9883
FAX: 856-792-9930
zhoriati@atl.lmco.com

Mr. John Welsh
Lockheed Martin Advanced Technology Laboratories
3 Executive Campus, 6th Floor
Cherry Hill,PA 08002
856-792-9880
FAX: 856-792-9930
jwelsh@atl.lmco.com

Mr. Thad Konicki
Lockheed Martin Advanced Technology Laboratories
3 Executive Campus, 6th Floor
Cherry Hill,PA 08002
856-792-9877
FAX: 856-792-9930
tkonicki@atl.lmco.com

Today's military campaigns require new approaches for effective generation of desired effects, and continuous adjustment of the actions, for the entire life of the campaign. Military planners are moving to effects-based operations (EBO) [1] to achieve these desired results using combinations of diplomatic, informational, military, and economic (DIME) actions. Intuitive and user-friendly tools are needed to help these planners (who are not computer scientists) understand how the desired political, military, economic, social, infrastructure, information (PMESII) effects can be achieved through a combination of DIME actions. Engineers at Lockheed Martin Advanced Technology Laboratories are developing the Automating Forecasting and Exploration of Complex Simulation Effects (AFECSE) tools and processes, as part of their research into the use of modeling and simulation, to develop and analyze campaign-level, effects-based operations. AFECSE represents the scenario as an ontology that describes the relationships between actions and nodes (people, places, and things). AFECSE tools are then used to map the ontology to an integrated set of multi-paradigm simulation models, spanning the PMESII spectrum, to create a virtual world. Users input DIME actions into the virtual world and run the simulation to determine the probable desired effects, as well as the undesirable effects, while developing a better understanding of second- and third-order effects. For this technology to be useful to military analysts and planners, it must be made accessible to and usable by non-computer scientists. Our goal is to help analysts and planners easily exploit the power of modeling and simulation for exploring effects-based operations, through automation of scenario development, model instantiation, integration and initialization, and course-of-Action (COA) development, simulation and analysis.

Evaluation of Pilot Implementations of the Guided Experiential Learning (GEL) Training Design Approach

AbstractID: 374

Dr. Brenda Wenzel, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1401, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-4661
DSN: 258-4661
FAX: 575-678-7042
brenda.wenzel@us.army.mil

Dr. Patricia Kinney, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1401, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-4223
DSN: 258-4223
FAX: 575-678-7042
patricia.kinney@us.army.mil

Ms. Lounell Southard, USA
TRADOC Analysis Center, TRAC-WSMR
Bldg. 1401, Martin Luther King Avenue
White Sands Missile Range,NM 88002
575-678-5915
DSN: 258-5915
FAX: 575-678-7042
lounell.southard@us.army.mil

The Training and Doctrine Command proposed a new Army Learning Model (ALM) to reshape Professional Military Education (PME) in response to the Army Force Generation (ARFORGEN) operational readiness cycle and prolonged resource constraints. The goals of the new model are to (a) reduce training time by leveraging technology, using Guided Experiential Learning (GEL) for training design, and streamlining resident training by implementing dual track training, a 6-day training week, and distributed learning; and (b) in the process, enhance training effectiveness.

Reported here is an evaluation of GEL-based face-to-face instruction, as the first foundational aspect of the ALM to be evaluated. Intended benefits of GEL are: increases in learning, reduction in learning time, higher learner satisfaction, and increases in training transfer. The Battle Staff Non-commissioned Officer Course (BSNCOC) at the United States Sergeants Major Academy and the Captains Career Course (CCC) at the Signal Center were selected to pilot the GEL approach. Comparisons of training outcomes and experiences were made between the

current training design and the GEL design where a single block of instruction was converted to GEL for purposes of the evaluation. GEL-designed instruction was expected to produce increases in learning efficiency, effectiveness, and instructional quality over the current design. The evaluation provided a comprehensive look at training issues through use of a multiple triangulation data collection approach (multiple data collections methods and sources) at both sites.

Modeling Leadtime Demand for Frequently-Demanded DLA Parts

AbstractID: 468

Mr. John Westbrook	**Ms. Golnar Vaziri**	**Dr. Tovey Bachman**
LMI	LMI	LMI
2000 Corporate Ridge	2000 Corporate Ridge	2000 Corporate Ridge
McLean,VA 22102-7805	McLean,VA 22102-7805	McLean,VA 22102-7805
703-917-7297	703-917-7901	703-917-7361
FAX: 703-917-7477	FAX: 703-917-7477	FAX: 703-917-7477
jwestbrook@lmi.org	gvaziri@lmi.org	tbachman@lmi.org

The leadtime demand distribution is a key element in the optimization of stock levels for frequently-demanded items, in which DLA seeks to minimize expected backorders for a given inventory investment. Since the early 1970s', DLA has been using the Laplace distribution for this purpose, owing to its mathematical tractability, and usability with limited computing resources. However, DLA has long known that the Laplace distribution does not fit all items well. With the advent of DLA's Enterprise Business System (EBS), alternatives to this choice of distribution may become available, along with new methods for estimating the mean and variance of these leadtime demand distributions. We present results of a study that determines classes of items for which particular distributions and parameter estimation methods work well. We assess the impact of the choice of leadtime demand distributions and parameter estimation methods on key inventory system metrics, using our Financial and Inventory Simulation Model (FINISIM). Our study's results could be used to improve the design or configuration of the stock level computation in EBS.

Analysis of field design considerations for the operation of undersea sensor networks

AbstractID: 188

Dr. Thomas A Wettergren	**Mr. Russell Costa**
Naval Undersea Warfare Center	Naval Undersea Warfare Center
1176 Howell Street	1176 Howell Street
Newport,RI 02841	Newport,RI 02841
401-832-1559	401-832-1552
FAX: 401-832-4666	costar@npt.nuwc.navy.mil
t.a.wettergren@ieee.org	

We present an analytical framework for determining the proper field-level characteristics for sensor networks deployed for undersea surveillance. Such systems are a cost-effective way to provide responsive surveillance support in areas that may be difficult to reach with large manned assets. Taking advantage of recent advances in distributed sensing technologies, these systems provide an opportunity to take a single sensor technology and apply it in different scalable manners to accommodate varied operational considerations. While these systems are comprised of individual autonomous sensing nodes, the detection events reported by individual nodes can be observed at a central control system to provide a "field level" view of the overall system. By considering the spatial and temporal sequencing of the individual detection reports, the combination of multiple sensors that correspond to a likely target can be determined – effectively creating a post-detection information fusion strategy for limiting the impact of random individual node false alarms that are prevalent in the undersea application. For a typical deployment scenario, the field design problem becomes one of determining the proper time interval for the accumulation of multiple detections, and the appropriate numbers of sensors to consider in that accumulation. We have developed an analytically-based method for making these field design decisions. This method provides parametric representations of performance that show how the various system parameters impact the performance of this centralized control effort. It also illustrates the dependencies that drive design considerations in the deployment of these systems. We present the technical details of the method and show how it is used to obtain general design guidance as well as specific field level design details. We show examples of how the techniques are used to provide important planning aids for designing the field level layout and operation for a network of passive acoustic sensors for undersea surveillance.

Employing Open Source Text Analysis for Extraction of Operationally Relevant, Spatially Referenced Socio-Cultural Data

AbstractID: 289

Dr. Lucy A Whalley, USA	**Mr. William D Meyer, USA**	**Mr. Timothy K Perkins, USA**
ERDC-CERL	ERDC-CERL	ERDC-CERL
2902 Newmark Drive	2902 Newmark Drive	2902 Newmark Drive
Champaign,IL 61822-1076	Champaign,IL 61822-1076	Champaign,IL 61822-1076
217-373-7243	217-373-4563	217-352-6511
FAX: 217-373-7222	FAX: 217-373-7222	timothy.k.perkins@us.army.mil
lucy.a.whalley@usace.army.mil	william.d.meyer@usace.army.mil	

Spatially and temporally referenced socio-cultural knowledge operationalizes information for military decision making. Researchers at the Engineer Research and Development Center (ERDC) have completed the first year of a two-year project entitled Actionable Cultural Understanding for Support to Tactical Operations (ACUSTO). Its objective is to develop methods for detecting changes in the incidence of violent events and identify significant socio-cultural factors associated with these events. The goal is to determine why and where violent events are most likely to occur based on an understanding of the drivers of spatial and temporal patterns. The approach is to use spatial and

non-spatial analysis to provide socio-cultural understanding in the operational environment that can be disseminated to the lowest tactical level. This presentation will report on the issues, approach, and results associated with the socio-cultural analysis in the ACUSTO project. This component employs analysis of open source texts to identify socio-cultural factors associated with neighborhoods that experience a high intensity of violent events determined by the spatial analysis. Neighborhoods in Baghdad, Iraq that demonstrate a high intensity of murders, kidnappings, and IED attacks for the period 1 Jan 2006 through 31 Jan 2007 comprise the sample for the socio-cultural analysis.

Analysis of available military records associated with events in Iraq reveals a lack of sufficient descriptive data from which to develop a socio-cultural characterization of neighborhoods. Therefore, open source media reports were investigated as a source for socio-cultural contextual information. In addition to the military, members of the media are the only on-the-ground, systematic observers of the situation and recorders of eyewitness accounts in an active war zone. The neighborhood as an analytical unit has wide applicability for analysis of urban environments worldwide relevant to operational level decision making. Currently, socio-cultural information made available to the military does not account for changes in adversary and civilian social dynamics at the neighborhood level, which is critical for understanding the situation on the ground. Issues of representation, sampling, measurement of socio-cultural factors, scale, and change detection will be discussed in reference to the approach selected as well as methods and results.

Effectiveness of Psychological Influence Calculator (EPIC) Methodology Overview

AbstractID: 122

Mr. Bud Whiteman
USSTRATCOM
500 SAC Blvd.
Offutt,NE 68113
402-294-6340
whitemab@stratcom.mil

The military operations community has been estimating the effectiveness of planned or contemplated kinetic operations for decades. A comparable process has long been sought for non-kinetic military actions including psychological operations (PSYOP) and other operations seeking to influence human perceptions and behavior. Estimating the effectiveness of a PSYOP campaign, or even an individual PSYOP product is recognized to pose a challenge to traditional, quantitative analytical methods. Human response to cognitive stimuli is difficult to predict, particularly if the same certainty as physics-based analytical methods of kinetic effects is desired. However, general principles of behavioral analysis and a careful study of the culture, environment, and circumstances of the intended Target Audience can be used to provide the military decision maker some standardized insight and relate a sense of effectiveness expectation of proposed PSYOP products and their underlying arguments. The Effectiveness of Psychological Influence Calculator (EPIC) application has been developed to provide this predictive analysis with included uncertainty estimates based on the clarity, objectivity, and pedigree of input data. The EPIC methodology and application seeks to provide some objective and repeatable decision support analysis to bring value to the decision maker in a context that promotes integration of PSYOP capabilities into comprehensive warplans. The methodology is intended to describe a structured framework which subject matter expert (SME) assessments can be leveraged to provide some valuable metrics to guide decision makers in selecting between alternative courses of action (COA) or trade-space studies of various strategies and tactics. As supporting empirical effectiveness data becomes more broadly collected, consolidated, and analyzed, this application may then also be used to make assessments as to the absolute value or effectiveness of a product, series, or likelihood of objective satisfaction. The EPIC methodology and application provides the user with a structured framework for analysis supporting:

- Selection between alternative PSYOP COAs based on relative effectiveness metrics;
- Identification of strengths and weaknesses of PSYOP plans, products, and tactics;
- Generalized trade-space studies between PSYOP operations and other operations with similar objectives; and,
- When available, leverage empirical effectiveness data to estimate the absolute likelihood of meeting PSYOP objectives.

Implementing ARFORGEN: Installation Capability and Feasibility Study of Meeting ARFORGEN Unit Reset Guidelines

AbstractID: 277

Dr. Steven P Wilcox
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-5114
FAX: 571-226-1588
steven.wilcox@serco-na.com

BG Dorian Anderson, USA (Ret)
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-3041
dorian.anderson@serco-na.com

Ms. Pamela Blackmon
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-1522
Pamela.Blackmon@serco-na.com

Mr. Paul Coviello
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-5279
Paul.Coviello@serco-na.com

Mr. Brendan Curvey
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-5105
Brendan.Curvey@serco-na.com

Mr. Hal Hogan
Serco, Inc.
2650 Park Tower Drive, Suite 800
Vienna,VA 22180
571-226-1549
Hal.Hogan@serco-na.com

The Army has replaced its long-standing Time Phased Force Deployment (TPFD) model with Army Force Generation (ARFORGEN), a new model that promotes de-centralized decision-making and redefined readiness. Under ARFORGEN, the Army eliminates its traditional division-based structure and replaces it primarily with a brigade-based structure. These smaller units are designed to be agile, expeditionary, tailored to specific circumstances (e.g., nature of threat, climate, terrain, etc.), and capable of rapid assembly. The ARFORGEN model allows the Army to build predictability in a cyclic way of producing forces for the Combatant Commander. ARFORGEN has placed new demands on the installations and these demands require study to measure the impact on the installation and unit level of the systems supporting the ACP. This study, completed in July 2007, examines the feasibility of implementing the unit reset stage of ARFORGEN based on a 30-day window for re-

staffing and the move into permanent housing at the start of a unit lifecycle. It assumes a 70% Unit Reset of a 7,000 Soldier unit under current resources and then under alternative scenarios. The resetting of equipment and training/readiness were not modeled. The analysis was implemented using a discrete event simulation model of the reset process in Java using SimKit. Model development was supported by the development of a process model for unit reset and relevant model parameters based on conducting interviews with subject matter experts, visits to five installations and an online Soldier survey. Based on the discrete event simulation model of the unit reset process, installation resource constraints – including the number of personnel, number of hours worked, temporary lodging, permanent lodging, movers and storage facilities – make it unlikely that installations would be able to meet ARFORGEN guidelines and provide units with Soldiers to begin collective training in a 30-day window assuming a 70% unit reset unless there are adjustments to resources and/or procedures.

Impacts of Inflation on Total Obligation Authority

AbstractID: 303

Lt. Col. Victor Wiley, USAF
AF/A9RP
1777 N. Kent Street
Rosslyn,VA 22209
703-588-6902
Victor.Wiley@pentagon.af.mil

As the DoD continues to compete for its share of Federal spending, it is important understand the sources of cost growth that drive its requests for funds. This study places sources of cost growth into three categories – inaccurate estimates, content change, and inflation. The effects of inflation ripple through the other categories as an under-riding current. Therefore, inflation was the initial focus of this study and this presentation focuses on the impact of inflation on Air Force Total Obligation Authority and its relative purchasing power with respect to inflation indices such as the consumer price index.

IAVSD Shot Assessment - A First Look

AbstractID: 348

Ms. Janet E Williamson
General Dynamics Advanced Information Systems
2210 8th St., Room 113
Wright-Patterson AFB,OH 45433
937-255-1165
DSN: 785-1165
FAX: 937-476-2900
janet.williamson@wpafb.af.mil

Mr. Timothy W Ewart, USAF
AFRL/RBCD
2180 8th Street, Suite 1, Room 244
Wright-Patterson AFB,OH 45433
937-904-6539
DSN: 904-6539
FAX: 937-255-9746
timothy.ewart@wpafb.af.mil

Mr. David P Whalen
General Dynamics Advanced Information Systems
2210 8th St., Room 113
Wright-Patterson AFB,OH 45433
937-255-1459
DSN: 785-1459
FAX: 937-476-2900
david.whalen@wpafb.af.mil

Mr. Chris R Linhardt
General Dynamics Advanced Information Systems
2210 8th St., Room 113
Wright-Patterson AFB,OH 45433
937-255-8629
DSN: 785-8629
FAX: 937-476-2900
chris.linhardt@wpafb.af.mil

In the future, long range strike aircraft will likely be tasked to penetrate an enemy's Integrated Air Defense System (IADS) and execute their strike missions without the aid of defensive escort aircraft. The strike aircraft will require improved combat survivability via an on-board self defense system. The goal of the Integrated Air Vehicle Self Defense (IAVSD) program is to evaluate and demonstrate technologies that can provide this self defense capability. Key component technologies include kinetic energy weapons, directed energy weapons, and an integrated Defensive System Manager (DSM) among others. The purpose of the quick-look study is to provide the designers of the self-defense component technologies with an initial assessment of the magnitude of the threat against the strike aircraft. Specifically, the study addresses the following research questions:
• In a future anti-access environment, how many shots will the strike aircraft need to defeat?
• How rapidly must the self-defense system deal with the shots?

The study will assess the magnitude of the threat as a function of several variables including:
• Scenario (threat environment)
• Surface-to-Air threat location uncertainty (intelligence)
• Target Depth (range of ingress/egress required)
• Enemy Shot Doctrine (S/A and A/A)
• Strike Aircraft Speed
• Strike Aircraft Platform Detection (RCS)

Key metrics for this analysis are number of shots, time history of shots, average time between shots, and shot geometry.

Automated Transcription Tool for Tactical Communications Assessment

AbstractID: 408

Mr. David Williamson, USAF
AFRL/RHCP
2255 H St
WPAFB,OH 45433
937-255-7593
david.williamson@wpafb.af.mil

Mr. Timothy Barry
General Dynamics Advanced Information Systems
5200 Springfield St
Dayton,OH 45431
937-255-8848
timothy.barry@wpafb.af.mil

Mr. Robin Snyder, USAF
AFRL/RHCP
2255 H St
WPAFB,OH 45433
937-255-8883
robin.snyder@wpafb.af.mil

This paper describes the development of a real-time automated transcription tool for assessing tactical communications in a DIS environment. Audio capture tools were developed to extract radio communications from various tactical training exercises conducted at the Warfighter Training Research Division of the Air Force Research Laboratory's Human Effectiveness Directorate. A representative set of audio data for two different training domains, air-to-air engagement and Joint Terminal Attack Controller (JTAC), was hand-transcribed and used as training material for a class-based statistical language model using a commercially available speech recognition system. The resulting system is a real-time automated speech-to-text transcription tool that logs the audio data obtained from signal PDUs as a standard wave file and produces a text transcription. In addition to the transcription output, the tool also produces a timeline of audio transmissions from each participant with the ability to automatically tag the timeline with specific events parsed from the transcriptions. This allows for rapid after action review and assessment. Additional development is underway to improve basic speech recognition performance and to expand the language models to cover additional domains of interest.

The Node Management & Deployable Depot (NoMaDD) ACTD

AbstractID: 305

Mr. David C Winyard
Defense Logistics Agency, DORRA
c/o DSCR, 8000 Jefferson Davis Highway
Richmond,VA 23297
804-279-2083
DSN: 695-2083
david.winyard@dla.mil

When U.S. military forces deploy, they require logistics support to achieve their goals, including a wide range of supplies provided by DLA, the military services, contractors, coalition partners, and other agencies. Unfortunately, during the opening phases of recent military deployments, including Operations Desert Shield (1990), Enduring Freedom (2001), and Iraqi Freedom (2003), there were serious problems and delays in setting up distribution infrastructure and processes. To prevent a reoccurrence, the Defense Logistics Agency (DLA)—in partnership with the U.S. Transportation Command (USTRANSCOM)—developed the Node Management and Deployable Depot (NoMaDD) Advanced Concept Technology Demonstration (ACTD). The ACTD program is conducted by the Office of the Under Secretary of Defense, Advanced Systems & Concepts.

NoMaDD's Node Management component seeks to improve the visibility of the flow of materiel through the distribution pipeline, providing accurate and actionable management information to requisitioners, transportation and distribution node operators, and distribution pipeline managers. For demonstration purposes, this will be accomplished through development of Information Technology tools to run on a proven tactical computer system, the Army's Battle Command Sustainment Support System (BCS3). Web-enabled capabilities will be demonstrated on the USTRANSCOM's Intelligent Road Rail Information Server (IRRIS).

NoMaDD will support regional Combatant Commander (COCOM) physical distribution requirements through development of a Deployable Distribution Center (DDXX) operated by trained personnel and providing consolidated shipping, receiving, cross-docking, storage, communication, and order processing capabilities. The Deployable Distribution Center will be suitable for rapid deployment and operation anywhere in the world.

DDXX demonstrations in Korea and Japan will allow USPACOM to assess the military utility of NoMaDD capabilities. Modeling, simulation, and analysis is expected to illuminate operational issues associated the employment of NoMaDD during a major military deployment.

Qualitative Social Science Methods for PMESII Analysis

AbstractID: 208

Dr. Yuna Wong, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street
Arlington,VA 22202
703-699-1718
DSN: 499-1718
FAX: 703-601-0357
yuna.wong.ctr@osd.mil

Currently within the DoD analytic community, the dominant analytic paradigm towards analyzing political, military, economic, social, information, and infrastructure (PMESII) issues is to default to quantitative and computer-oriented approaches. While there are much inherent strength in statistical analysis and models, it is important to leverage the qualitative methods that are also standard in many of the social sciences. DoD's standard methodological repertoire that it brings to bear in PMESII analysis is painfully narrow, often wildly inappropriate, and

is only now starting to crawl away from operations research (OR) techniques used for kinetic analysis.

This presentation reviews some of the qualitative methods from the social sciences that are widely used to assess social phenomena. Methods discussed will include case studies, cultural domain analysis, and others. Instead of limiting itself to a local search and hence a local optimum, the analytic community should conduct a global search and sample from a wider area to find analytic methods that may prove optimal for PMESII analysis. Also related to the issue of methodology is that of study design, and the need to move away from OR-based study design in order to improve PMESII analysis.

Dangerous Liaisons? Past Affairs Between DoD and Social Science During Times of Insurgency

AbstractID: 209

Dr. Yuna Wong, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington,VA 22202
703-699-1718
DSN: 499-1718
FAX: 703-601-0357
yuna.wong.ctr@osd.mil

Recently, the greater urgency of insurgency and irregular warfare has drawn increased attention to engaging the social sciences in DoD analysis. DoD made similar attempts to leverage social science during the 1960s, a period when concern about communist revolutions piqued interest in understanding insurgency. One aborted attempt from this era was Project Camelot, a DoD-sponsored, interdisciplinary social science effort that would produce a generalized model of the revolutionary process. Despite hopes by some that it would represent the launch of significant military funding going towards social science, Project Camelot drew a firestorm of domestic and international criticism and was canceled. Another effort from the 1960s was the U.S. Army's decision to embrace and institutionalize social science, particularly psychology. Unlike DoD's experience with Project Camelot, the Army's effort met with much more enduring success.

What were the reasons for Project Camelot's spectacular crash and burn? Do these conditions still hold today? On the other hand, how successful was the Army in meeting its 1960s vision of bringing elements of social science to bear for its needs? What can the community learn from this relatively more successful effort?

Social Science Foundations for GWOT Analysis

AbstractID: 264

Dr. Yuna Wong, OSD
OSD(PA&E)/Joint Data Support
2521 South Clark Street - Suite 550
Arlington ,VA 22202
703-699-1718
DSN: 499-1718
FAX: 703-601-0357
yuna.wong.ctr@osd.mil

As the DoD analytic community dedicates more effort to developing irregular warfare (IW) models and tools, it is becoming more important to ensure that these analytic tools as based on solid social science. This presentation discusses a RAND project funded by the Modeling & Simulation Steering Committee (M&SSC) to establish the social science foundation for counterterrorism (CT) and counterinsurgency (COIN) analysis. RAND will take an interdisciplinary survey of existing research to answer five questions: 1) When and why does terrorism arise? 2) Why and how do people become terrorists and others do not? 3) What determines terrorists' decisions and behaviors? 4) How do terrorists attempt to generate and sustain support? 5) How does terrorism end? The final report will identify relationships based on existing research, areas of consensus, areas of disagreement, and gaps in knowledge. The RAND effort will also develop an analytic framework based on their findings, and make methodological recommendations for CT and COIN analysis.

A Model of Migration Choices for Undocumented Immigrants

AbstractID: 166

Dr. Charles A Worrell
MITRE
7515 Colshire Drive
McLean,VA 22102
703-983-1802
cworrell@mitre.org

This paper will demonstrate the application of a behavior modeling technique to forecast the migration choices made by undocumented immigrants in response to changes in US immigration policy.

Resourcing the Global War on Terror

AbstractID: 254

LTC Eugene Yancey, USA
USSOCOM
7701 Tampa Point Blvd
MacDill AFB,FL 33621-5323
813-826-2210
DSN: 299-2210
eugene.yancey@hq.socom.mil

In the fall of 2006, USSOCOM began to examine how the Global War on Terror (GWOT) should be resourced. Following this problem framing, USSOCOM began researching methods to improve the process to prioritize GWOT shortfalls. One technique explored was value-focused thinking. The technique proved applicable and is currently being employed to prioritize GWOT shortfalls. Two models were developed; one model values shortfall contribution to the GWOT, while the other model is used to determine operational risk to accomplishment of the GWOT plan. The product of this effort is the result of collaboration between all of the COCOMs and the Joint Staff. COCOMs identified GWOT shortfalls by considering their War on Terror plans and submitted these to USSOCOM for consideration. A USSOCOM working group scored each shortfall using the two models. The shortfall prioritization product, approved by the USSOCOM commander on 15 Jan 2008, allows the framing of long term GWOT resourcing discussions. The Joint Staff J8 will ensure that the results are properly integrated into the planning, programming, budgeting, and execution process within the Department of Defense.

Hospitalization metrics among USMC deployed in support of OIF and OEF

AbstractID: 73

Mr. James Zouris
Naval Health Research Center
140 Sylvester Road
San Diego,CA 92106
619-553-8389
FAX: 619-553-8378
james.zouris@med.navy.mil

Ms. Noelle Gronroos
San Diego State University Research Foundation
5250 Campanile Drive
San Diego,CA 92182
619-553-8026
noelle.gronroos@med.navy.mil

The objective of this presentation was a retrospective evaluation of hospitalization metrics among USMC who were deployed in support of the OIF and OEF. Hospitalization metrics are a subset of planning factors needed to estimate the medical support requirements such as the number of beds, blood, OR tables, and staff. Requirements estimation is calculated by multiplying the population at risk by the casualty rate per 1000 strength per day. The study population consisted of 170,704 USMC personnel deployed from 9/11/2001 to 1/31/2007. Hospitalization records were obtained from the Career History Archival Medical and Personnel System (CHAMPS) Standard Inpatient Data Record (SIDR). Peak hospitalization rates occurred during periods of high battle intensity; at the peak of intensity in Nov 2004, a total of 160 beds were required which corresponds to an admission rate of 0.24 per 1000 strength per day.

Military Occupational Specialty (MOS), a job classification taxonomy used in the US Army and Marine Corps, was found to impact illness and injury distributions, admission rates, and cause of injury. For Infantry the admission rate was 0.60 per 1000 strength per day in Nov 2004. Compared with the overall average, Infantry admission rates were twice as high. Infantry were also more likely to be injured and more likely to be hospitalized due to an explosive. In addition, US Marines who were hospitalized during deployment had statistically different age, pay grade, and length of service compared to US Marines who were not hospitalized during deployment.

Accurate estimates of the population at risk, casualty rates, evacuation policies and delays, and the anticipated threat of the host nation are essential components in determining support requirements for successful medical CONOPS.