Working Group 6 – Advances in OR and Technology

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Ground System Infrared Signature Modeling and Analysis

[27 Oct 15, 1330-1400, Rm 10B]

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Keywords: Infrared signature, delta T, finite difference method

ABSTRACT: The United States Army Materiel Systems Analysis Activity (AMSAA) Combat Support Analysis Division (CSAD) Intelligence, Surveillance and Reconnaissance (ISR) activity models, verifies, and maintains signature data for direct system performance comparison analysis and for combat simulation support. Threat sensors exploiting infrared (IR) band signals key off differential temperature or “delta T.” CSAD/ISR is currently using a COTS analysis package, ThermoAnalytics MuSES to predict ground systems IR signatures in delta T against selectable backgrounds in selectable environments. Taking advantage of the surface nature of the task, IR analysis has been developed in the finite difference modeling method. Finite difference analysis runs quickly, models are rapidly reconfigurable by varying materials definition, and results are well validated. However, the method looks for model surfaces to be meshed with quad-shaped elements, and common model sources and meshing tools produce surface meshes of triangular shaped elements. A process for tailoring available models for MuSES finite difference IR analysis, including conversion to quad element meshes, utilizing the available tools BRLCAD and Rhino has been developed and results for multiple representative systems will be presented. The resulting simplified models will be considered for accelerating other types of analysis like RCS estimation.

Innovative Implementation of AWARS to Support Sustainment Operations

[27 Oct 15, 1400-1430, Rm 10B]

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Keywords: Logistics, Logistics Manager, Support Operations Officer

ABSTRACT: In the ADP, 4.0 logistics is defined as “planning and executing of the movement and support of forces”. The importance of logistics in sustained combat operations is crucial and must be accurately represented in combat simulations. One concept difficult to portray in a combat model is that of proactive logistics which focuses on the future needs of the unit. The Advanced Warfighting Simulation (AWARS) simulation developers and analysts instituted an enhancement which created the logistics manager to mimic this behavior of the support operations section.

The logistics manager will handle all supply requests based on the supported unit’s logistics status report and dispatch sustainment replenishment operations as needed. This capability will give the supporting unit visibility of the current supply levels for all supported units. This enhancement will enable the responsiveness of the supply chain based on a supported unit’s logistics status, the supporting unit supply level, the logistic assets on hands, the priority of support, and the supported unit consumption rates.

This presentation will describe the methodology and the behaviors being replicated by the logistics manager. This focal point for logistical decision making in the unit will more accurately represents how logistics operates in a unit, creates a proactive rather than reactive concept of support, and ensures no logistical shortfalls in the concept of operation.

Managing ATEC Enterprise Test and Evaluation Data: Standardizing Reliability and Maintainability Data Collection and Archival

[27 Oct 15, 1430-1500, Rm 10B]

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Keywords: Change Management, Test and Evaluation, RAM

ABSTRACT: In support of the Army Test and Evaluation Command (ATEC) strategic plan to improve Enterprise Test and Evaluation Data Management, ATEC is standardizing Reliability and Maintainability (RAM) data collection and archival. This standardization effort encompasses all Army programs, both technical and operational tests. The goal of the standardization is to ensure that RAM data is discoverable, accessible, and utilizable to increase the usability of reliability data within the Army analytical community. To meet this goal, it was not sufficient to just select a tool, development of the associated work processes and enablers was required. Emerging results from the three beta tests provide insight into how the transition to standard RAM Tool was managed.

Unambiguous Terrain Database Requirements Capture and Tracking with Google Earth Pro™

[27 Oct 15, 1515-1545, Rm 10B]

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Keywords: Synthetic environment, terrain database, environmental representation, google earth

ABSTRACT: The desire to make an increasing number of military training and simulation systems interoperable is a very real challenge faced by the modeling and simulation community. Synthetic environment correlation, a necessary element of interoperability, poses unique challenges when considering performance requirements of low-fidelity legacy systems and those of next generation Gaming systems. In order to facilitate correlation, performance tradeoffs must often be made in each system, to include terrain database content, size, and fidelity, for each respective output terrain format. In the past, the Synthetic Environment Core (SE Core) program used a singular text-based document to track all terrain requirements for a given terrain database generation effort. These requirements included, required terrain output formats, required feature content for each of these formats, and the geographical extents of each. As the number of required terrain output formats grew, this requirements document became overly complicated and time consuming to create, track, and review by all stakeholders.

As an answer to this burdensome document process, the SE Core program implemented a graphical solution in the form of a Google Earth Pro™ KML geographic data file. Utilizing multiple file structures, vector overlay colors, graphical symbols, and embedded comment fields, SE Core was able to create a more robust requirements tracking document that could be easily shared between and interpreted by the capability manager, materiel developer, and contractor representatives. Additionally, the wide availability of the Google Earth™ application allowed this document to be easily reviewed by terrain database End Users and confederated system programs in order to provide graphical and unambiguous requirements feedback.

Military Wheeled Vehicle Weight Estimation With Condition Based Maintenance Sensor Data

[27 Oct 15, 1545-1615, Rm 10B]

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Keywords: Weight Estimation, Machine Learning, Condition Based Maintenance, Mobility Power Modeling, Empirical Data Modeling, Machine Learning

ABSTRACT: Knowing military wheeled vehicle cargo weights is important for both operation planning and estimation of vehicle reliability, mobility and maintainability. Due to the limitation and practicality of physically weighing each truck frequently across a fleet, truck cargo weight estimation has been an engineering barrier and a technical challenge.

In this analysis, three engineering approaches have been studied based upon data availability and precision requirements. The first method is based upon a power demand and power supply mobility model which estimates one optimal vehicle weight so that power demands from rolling resistance, slope climbing, aero drag and acceleration would equal to engine power output. The second method is based upon an empirical energy efficiency model with field vehicle engine sensor data. This method identifies vehicle energy coefficients and the major input factors. As one key input factor, vehicle weight can be projected from a 2 dimensional or 3 dimensional empirical coefficient model. The last method is by leveraging the latest data mining and machine learning technology. A few supervised machine learning methods have been compared and combined for best estimation results, such as: a dynamic neural network, a non-linear regression, a nearest neighbor classification and a Naive Bayes and support vector method.

This research concludes with practical application tips to select a best method for military truck operation weight estimation with acceptable precision depending on data availabilities.

Planning Logistics Analysis Network System (PLANS) Tool

[27 Oct 15, 1615-1645, Rm 10B]

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Keywords: Logistics, A2AD, Austere Entry, Expeditionary

ABSTRACT: As the U.S. military places more emphases on operations in Anti-Access Area-Denial (A2AD) environments, the ability to establish and sustain logistic support for US and coalition forces at ranges exceeding 1,000 nautical miles looms as a major issue to resolve. Logistics commanders need tools and processes to that take into account environmental and operational factors to help them plan for and ensure visibility of all requirements, resources, and capabilities throughout the full length of the logistics trail to affect the level of coordination required to support the operations in A2AD environment. To facilitate strategic and operational planning for such operations, the US Army Engineer Research and Development Center is currently developing the online program, PLANS (Planning Logistics Analysis Network System). PLANS will be used to analyze a set of early entry alternatives to optimize effectiveness and efficiencies adapting to environmental conditions such as weather, bathymetry, terrain, and sea state in support of joint logistics over-the-shore (JLOTS) and the austere entry, specifically during the A2AD mission. PLANS allows for comparison of early entry alternatives for courses of action for force projection and generates low to high range fidelity predictions across different transportation modes and environmental effects. Capabilities will include: perform what-if scenarios, highlight potential high-risk areas/points, calculate throughput estimates for land, air, and sea, and identify transportation bottlenecks and offer solutions. This presentation will focus on a training scenario use case exploring the use of different austere ports as well as degraded bridges. Different scenarios will be analyzed to provide leaders with viable courses of action in a dynamic environment impacted by weather, enemy and neutral force activities, and sustained operations.

Enhanced Force-on-Force Modeling to Support Developmental/Operational Testing

[28 Oct 15, 0945-1015, Rm 10B]

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Keywords: The Military Decision-Making Process, Joint and Service Task Lists, Component-Level Modeling

ABSTRACT: Since the onset of modern Force-on-Force (FoF) modeling in the 1960s, simulations have been driven by task sequences defined by computer programmers. That was necessary since for many decades, military operators/warfighters had no standard task language. In the 1990s, official Joint and Service task lists were developed, establishing formal, doctrinally-linked semantics for the warfighter. This language construct enables evaluation of individual system contribution to collective tasks (the singular source for System-of-System conduct), mission performance and effectiveness. Also, since the 1960s, FoF models have employed combat entities with assigned, unchanging attributes. Interactions have focused on ballistic events, on pristine platforms, for kill/ no-kill outcomes. However, since the 1980s, platform models have existed to support detailed, mutable, internal component geometry so as to maintain a running status of component state space. This state space can be mapped to platform capabilities and then compared to the mission task requirements per the formal task descriptors.

We present a form of FoF modeling using both formal tasks and dynamic geometry. The specific application can support a combined DT and OT strategy per the mission of ATEC/AEC. And beyond testing, this singular integrating formalism has significant ramifications across a broad group of requirements, research, test, training, and analytic activities, all of which are identically mirrored in this conceptual model.

With this approach it is possible to emulate closely the method used by military planners, the Military Decision-Making Process (MDMP), as the structure to plan, monitor and assess execution of operations against mission objectives. And by using detailed component geometry to represent the status of each platform, sequences of interactions, both friendly and enemy caused, can be used to update the state of each component. That enables the analyst to estimate the capabilities of each platform and compare the capability against the task-driven demands of the mission.

This presentation will review the suggested extensions to FoF analysis including both task analysis by level of war and the methods used to model and continuously update platform capabilities. Finally this new paradigm will be related to the needs and strategies of both Developmental and Operational Testing.

A Soldier System Engineering Architecture (SSEA) Modeling and Simulation Application

[28 Oct 15, 1015-1045, Rm 10B]

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Keywords: Advances in OR, Combat Simulation as a Service, Systems Engineering, Architectures, Modeling and Simulation

ABSTRACT: The purpose of the Soldier System Engineering Architecture (SSEA) Science & Technology Objective (STO) is to create a principle-based soldier architecture and framework to enable system-level tradeoff analysis and create the foundation for design parameters for next generation soldier system and subsystems based on human performance capabilities, the full complement of equipment, and mission tasks.

Modeling and Simulation (M&S) is a critical component of the SSEA strategy. SSEA will develop the soldier decomposition (SSEA Work Breakdown Structure) and the SSEA Soldier-Equipment-Task (SET) framework. SSEA will thereby serve as a test bed for concept exploration and requirements definition, and provide a space to investigate R&D investment decisions.

The M&S component will include on-demand Combat Simulation as a Service (CSaaS) to enable interdisciplinary cross-community/domain analytical environment(s) to address SSEA user and enterprise needs.

This paper will discuss the goals of the SSEA STO, our initial M&S implementation plans, the challenges associated with providing a seamless decomposition of the Soldier, and SSEA's relationship to current soldier modeling programs such as the Distributed Soldier Representation (DSR), Executable Architecture Systems Engineering (EASE) Distributed Modeling Framework, Improved Performance Research Integration Tool (IMPRINT), and Infantry Warrior Simulation (IWARS).

OPLAN Fratricide

[28 Oct 15, 1045-1115, Rm 10B]

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Keywords: Risk and Mitigation, Contingency Sourcing

Abstract approved for public release.

ABSTRACT: Operational Plan (OPLAN) Fratricide is the detrimental impact on one or more operations when executing multiple OPLANs at the same time or near-simultaneously. This study was performed to help US Army Pacific (USARPAC) understand the risks inherent with unanticipated execution of near-simultaneous OPLANs as might occur during a serious, large-scale, region-wide international incident. In order to assess the risks associated with OPLAN fratricide, planning assumptions were used to define a contingency sourcing strategy and a methodology was developed to show how filling the conditional demands identified in the OPLAN documents known as Time-Phased Force Deployment Data (TPFDDs) may confound rapid response to a crisis. The analysis showed where single units were called upon to meet multiple missions, and identified the magnitude of the risk and ways to mitigate the risk. That is, can a unit do two things at once? If not, can we employ a different unit? If not, can we increase the Army's capacity?

Complex Military Mission Environment (CM2E) Model

[28 Oct 15, 1115-1145, Rm 10B]

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Keywords: human domain, social science, PMESII, closed-form model

ABSTRACT: Today's military operates in an interconnected and complex world. The pace and global impact of actors pursuing varied and often conflicting objectives, add to the complexity. These complex environments are primarily defined by the human domain and impacted by cyberspace, public opinion, religion, and culture as well as the infrastructure, political, economic, and legal systems. One of the many challenges of experimentation in complex environments is the ability to simulate and measure the environment's abstract factors (e.g. political, social, cultural, and economic). In order to meet the needs of decision makers in complex environments, the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) designed a model that decomposes the operational environment into two key components.

To develop the deterministic environment model component, the TRAC team decomposed the Joint doctrinal operational variables of political, military, economic, social, information, and infrastructure (PMESII) into a conceptual model of 900 observable and measurable variables with over 800,000 potential interactions. Applying social science theory, military doctrine, and operational experience from Iraq and Afghanistan, TRAC reduced the construct to a universal, validated subset of 69 variables and 672 interactions. Simple algebraic models describing the strength and direction of these variable interactions were then derived through regression analysis on empirical data. These interoperable models provide decision makers with a range of possible outcomes for complex military missions in complex environments.

The second key component is a stochastic dynamic model that represents scenario and mission variables. This model allows actors and their actions to be decomposed and simulated in the form of highly adaptable decision tables. The hypothesized and measured effects of those actions are then integrated into the environment model. This modeling capability provides an adaptive and simple analytical tool for hypothesis testing, experimentation, and comparative analysis.

This presentation will discuss TRAC's approach to developing this capability as well as how this capability is aimed at being an easy to adapt, closed-form model that is designed and used by analysts.

Urban Clearing Operations in the Advanced Warfighting Simulation – A Proof of Principle

[28 Oct 15, 1300-1330, Rm 10B]

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Keywords: Urban Clearing, Simulation, Elicitation, Probability

ABSTRACT: Operations during the last 10 years required combat units to operate in and conduct tactical-level urban-clearing operations. In order to ensure appropriate model representation, the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) enhanced the ability of the Advanced Warfighting Simulation (AWARS) to represent urban-clearing operations with greater fidelity in anticipation of the continued requirement to analyze urban operations. Key to this model enhancement was improved representation of building-clearing times. TRAC combined an operations research technique known as Subject Matter Expert Elicitation with combat experience to provide a range of probable values for building-clearing times. This approach served as a proof of principle and will be refined, implemented, and expanded upon in accordance with analytic requirements.

This presentation will describe the analysis methodology, the model, intended model implementation, and areas for further research.

Unified Challenge SIMEXp Data Reduction, Extraction, and Analysis

[28 Oct 15, 1330-1400, Rm 10B]

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Keywords: Army experimentation, Unified Challenge, bootstrap, R, science and technology, data extraction and reduction

ABSTRACT: Unified Challenge (UC) is the Army's main effort to inform the transition into Force 2025, or the transition of concepts into capabilities. The UC SIMEXp informs the DOTMLPF requirements for the future force. The simulation OneSAF and a federation of other simulations is the primary vehicle by which the community of practice uses to stimulate feedback to the proposed requirements. The output log files from the models are often very large and thus inhibit quick reduction and analysis. This discussion will focus on two improvements in the administrative arena where improvements to the data reduction has increased the ability to get access to data faster.

The first improvement is the ability to get near-real time updates for the daily damage reports. Using a R script to get damage effects information from a website, the analysts are able to provide a roll up of the daily killer victim tables and rollups. This report is used to brief the day's events at a glance during the end of day hot-washes. In addition, this also gives the analysts the ability to gain situational awareness at any given point in the day to see the effectiveness of categories of weapon systems.

The second improvement is the ability to quickly read in and create cumulative reports from the log files, which can be up to 5-6 GB per day. These larger files are reduced and manipulated in order to extract meaningful information such as position location information and casualty statuses. In particular, this reduction allows for the resampling of distributions in order to compare S and T systems. This information can be used in future events to help recreate key situations in order to drive additional discussion on force employment and force design.

COMBATXXI Urban Operation Enhancements (CUOE)

[28 Oct 15, 1400-1430, Rm 10B]

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ABSTRACT: The Combined Arms Analysis Tool for the 21st Century (COMBATXXI) is a state-of-the-art, force-on-force, event driven, stochastic simulation originally developed to model conventional warfare operations of tank against tank in open terrain. Both Army and Marine analysts have identified the limitation of using COMBATXXI to simulate urban warfare. To partially address this limitation, the Marines are sponsoring a multi-organizational effort titled COMBATXXI Urban Operation Enhancements (CUOE), which is led by the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC). Three main tasks were identified to be addressed: (1) measuring the effectiveness of munition fragmentation on targets within buildings; (2) improving line-of-sight calculations for partially concealed targets; and (3) enhancing a target's ability to limit being acquired by reducing their exposed area when near apertures, building corners, or rooftops. With these enhancements, COMBATXXI has been shown to provide improved representations for the complex environment of urban warfare. This presentation will describe modeling efforts to support these COMBATXXI urban operation enhancements.

Environmental Sensing in COMBATXXI to Facilitate Representation Improvements of Search and Target Acquisition (STA) and Maneuvers in Urban Operations

[28 Oct 15, 1445-1515, Rm 10B]

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Keywords: Environmental sensing, search, acquisition, maneuver, urban operations, buildings, COMBATXXI, modeling, simulation

ABSTRACT: Improved representation of the urban fight in combat models is increasingly becoming a critical requirement for the U.S. Army. Simulating the changing characteristics of urban operations presents many challenges for modeling and simulation tools. One important challenge to resolve is the ability to provide entities with critical knowledge about the environment in order to improve their interactions in urban settings and more effectively accomplish mission goals. Within the Combined Arms Analysis Tool for the 21st Century (COMBATXXI) simulation, a representation for sensing environmental objects was developed to allow entities to survey potential hostile environments and identify cover and concealment features to support optimized mission execution, maneuvers, and engagements. Entities have improved environmental sensing, critical knowledge gathering, and knowledge management and sharing capabilities.

This presentation will describe initial modeling efforts to support sensing of critical environmental objects to improve representation of search and target acquisition processes and maneuvers in complex urban environments.

Aerial Context Sensitive Search (ACSS) in COMBATXXI

[28 Oct 15, 1515-1545, Rm 10B]

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Keywords: Aerial Sensors, Search, Scenarios, Simulation, ASRP, ACSS, COMBATXXI

ABSTRACT: Historically, the representation of aerial search in combat simulations differed little between ground-based sensors and aircraft sensors. The Aerial Sensor Research Project (ASRP) was a joint effort to enhance the depiction of aerial search in the Combined Arms Analysis Tool for the 21st Century (COMBATXXI), a high-resolution, entity-level, stochastic, combat simulation co-developed and used by the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) and the United States Marine Corps, Marine Corps Combat Development Command (MCCDC).

The most significant problem with legacy representations of aerial search is inadequate coordination of sensor field of view (FOV) management with aircraft motion. To address this problem, the ASRP produced a set of methodologies and tools called the Aerial Context Sensitive Search (ACSS). ACSS uses an objective-focused approach that decouples maneuver from the search process, allowing COMBATXXI to accurately model the tactically-correct employment of aerial search. This presentation will describe ACSS and how it improves the representation of aerial search in COMBATXXI.

Enhancing Tradespace Analysis Capabilities

[28 Oct 15, 1545-1615, Rm 10B]

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Keywords: Advances in OR, Tradespace Analysis, Systems Engineering, Executable Architectures, Modeling and Simulation

ABSTRACT: Tradespace analysis tools provide a robust and powerful capability to support exploration while simulations provide a synthetic environment capable of representing many aspects of military operations. When combined, there are endless possibilities; however, mapping capabilities to the user gaps are a nontrivial endeavor.

This presentation focuses on the results of the second phase of the Office of the Secretary of Defense (OSD) Engineered Resilient Systems (ERS) Research Thrust to enhance the interface developed between a tradespace analysis tool, the ERS Tradespace tool based on the Framework for Assessing Cost and Technology (FACT), with a distributed simulation management tool called Executable Architecture Systems Engineering (EASE).

It discusses the benefits, the methodology employed, the technical lessons identified in connecting disparate systems with dissimilar semantics, and the unexpected challenge in helping the user realize potential uses.

It concludes with an illustration of how these connected tools enable a quicker means to manipulate attributes of a system under analysis within the ERS Tradespace, and with an abridged set of viable designs, launch a simulation environment to further analyze the proposed systems within the context of a force modeling suite of simulations.

Automated Data Collection for MIMO Transceivers

[28 Oct 15, 1615-1645, Rm 10B]

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ABSTRACT: A key performance criterion of digital radio systems is packet completion rate (PCR) over a non-ideal link connecting two transceivers. Traditionally, in a laboratory environment where link attenuation is controlled, a packet stream is sent over the link and PCR is simply the ratio of received to sent packet counts. MIMO (Multiple Input, Multiple Output) antenna systems, however, require more complex lab testing. Systems of multiple antennas make combined use of the signals received by each antenna. Because processing gains are seen in an environment where frequency dependent fading, signal amplitude change, and phase change exist, a test bed must include these features. A channel model providing such features introduces randomness requiring a data collection scheme based on statistical methods to determine when enough measurements have been taken. This paper presents the challenges for MIMO testing and a general purpose program used to collect performance data. It is written in the Python programming language, runs on the linux operating system, controls lab equipment, and generates a report based on specified confidence interval and tolerance. When enough samples are collected, equipment settings are automatically changed, gear recalibrated, and a new run commences. The result is a laboratory arrangement where several tests can be run simultaneously, faster than manual runs, lower likelihood of human error, and data collected with statistical foundation.

Modeling the Complexity of Intelligence Processing, Exploitation, and Dissemination with the Fusion Oriented C4ISR Utility Simulation

[29 Oct 15, 0945-1015, Rm 10B]

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Keywords: M&S, ISR, ISR Simulation, PED

ABSTRACT: The increase of Intelligence, Surveillance, and Reconnaissance (ISR) Systems, both Programs of Record and Quick Reaction Capabilities, over the past decade has resulted in a significant increase of raw collection data available to the Army and Intelligence Community. This surplus of data has made it increasingly difficult to conduct efficient processing and analysis in order to produce timely combat information and actionable intelligence. Within the Army, this problem has sparked changes to intelligence related force structure, development of new complex information systems, and other advancements, specifically in Intelligence Processing, Exploitation, and Dissemination (PED). PED is the process that supports intelligence operations by converting and refining collected data into usable information for reporting to commanders, decision makers, intelligence analysts, and other consumers. This process is the crucial bridge between the collection asset and the analyst for the production/creation of quality intelligence products. In order to meet the emerging needs of the Army and Intelligence Community, the Army Materiel Systems Analysis Activity (AMSAA) has initiated a PED modeling effort to increase the analytical capabilities of our tactical-level ISR simulation, the Fusion Oriented C4ISR Utility Simulation (FOCUS). The overall objective of the PED modeling effort centers on developing a methodology capable of producing metrics that measure the effectiveness of the PED process within the framework of the Intelligence Process, and allows tradeoffs of PED architecture attributes and enablers that will alter the measures of effectiveness for that PED implementation. The addition of a PED modeling capability into a tactical-level ISR performance simulation, such as FOCUS, provides PED-related analysis to inform materiel acquisition decisions; support trade analysis of PED architecture materiel components/enablers that could also include assessment of emerging PED technologies and algorithms; and could increase fidelity of ISR collection and tasking in current/future Modeling & Simulation (M&S). The content of this briefing centers on the development of an Intelligence PED methodology that will result in a new architecture implemented within FOCUS that will enable the insertion of PED and other Intelligence processes into tactical vignettes.

The Low Fidelity Target Acquisition Model Methodology

[29 Oct 15, 1015-1045, Rm 10B]

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Keywords: Search and Target Acquisition, ACQUIRE model

ABSTRACT: The Low Fidelity Target Acquisition Model (LFTAM) is a three parameter piecewise function that produces a reasonable fit to the output of ACQUIRE-Targeting Task Performance Metric (TTPM), ACQUIRE-Targeting Angular Size (TAS), and Night Vision-Integrated Performance Model (NV-IPM). The purpose of LFTAM is to provide a computationally simplified method to produce probability versus range data for various categories of targets. This presentation outlines the implementation procedures and the categories used to derive the parameters used in LFTAM. Initial categories of targets are aircraft, engineering vehicles, helicopters, tanks, trucks, and Unmanned Aerial Vehicles (UAV's). Depending on the required fidelity and interest in environmental factors, additional degrees of freedom could be added to reflect the time of day, atmospheric turbulence, location etc.

Making the Leap from Analysis to Analytics

[29 Oct 15, 1015-1045, Rm 5]

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Keywords: Analytics, big data, data architecture, data science, software engineering, cyber

ABSTRACT: In his 1982 book, Megatrends, John Naisbitt noted, “We are drowning in information but starved for knowledge.” The explosion in big (high volume, velocity, and variety) data on military networks only exacerbates this situation. Analytics help organizations close the gap between information and knowledge by multiplying the effectiveness of data analysis. This presentation provides an overview on making the transition from analyzing data to providing analytic tools that continuously provide the knowledge organizations need to make better decisions. Topics include: the big-data learning paradigm; how data architecture, data science, and software engineering must be integrated to build analytic tools; an overview of how freely available open-source software can (and is) being used on military networks (NIPR/SIPR/JWICS) to rapidly field analytic tools; and lessons learned from developing and deploying analytics in support of Defensive Cyber Operations (DCO) for Army Cyber Command.