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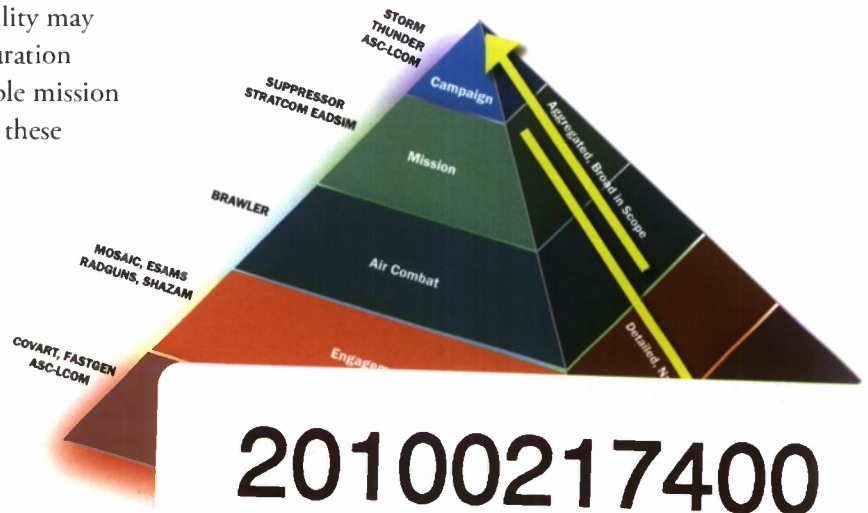
Insights to survivability and vulnerability impacts through campaign analysis

By Ryan Farmer, Booz Allen Hamilton

Some issues relating to survivability and vulnerability may require the examination of impacts over longer duration employments (days to months) to consider multiple mission areas and the tradeoffs between them. Insights to these types of issues can be found in campaign analysis.

Campaign analysis examines force on force level warfare, where a Joint Force environment is considered in the context of all dimensions of warfare—air, land, sea, space, and cyberspace. All of the many systems and related organization supporting these various mediums are characterized, along with the concept of operations for employing assets to achieve objectives. Campaign level metrics tend to address big picture, over time Measures of Outcome (MOOs), such as days to achieve air superiority or days to halt an enemy's advance. Supporting MOOs are Measures of Effectiveness, or MOEs, which address impacts of systems and organization. MOEs dealing with survivability are obviously attrition based (namely system losses); however, with the changing face of warfare moving away from the more conventional view, how these MOEs relate to situational awareness and logistics are of increasing interest to the warfighting community. Despite this shift, survivability and vulnerability are issues which should continue to be at the forefront of analyzing the most dangerous of scenarios. Campaign analysis, through the use of a campaign model, is well equipped to provide insights to survivability and lethality, with tremendous potential to capture vulnerability aspects.

Each of the military services has developed its own campaign model, with each model having a mission level emphasis with respect to the service which created it. Ground warfare is the emphasis of the Joint Integrated Contingency Model (JICM), used by the US Army. A Naval warfare emphasis can be found in the US Navy's Integrated Theater



Engagement Model (ITEM). Air warfare is the focus of the Air Force campaign model THUNDER. In the 1990s, the Air Force began development of what is now the Synthetic Theater Operations Research Model (STORM), and the model is now at the heart of most Air Force campaign studies and will be the Navy's primary campaign model by FY2010. Joint Forces Command continues support to the Joint Analysis System, or JAS (formerly JWARS), and is used in the Command's studies and analyses. With the variety of campaign models available, knowing study/analysis critical issues and appropriate metrics up front should be a driver to select the best campaign model to address the most metrics with the needed level of fidelity.

Learning the art and science of campaign analysis, particularly while learning a complex campaign model, is no overnight task. Campaign analysts spend many months to years learning their campaign model to get the most out of the model by leveraging creative and innovative ways to implicitly

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Send us your feedback!

We would like to hear from you. Have we helped you in some way? How can we improve? Would you like to author an article for a future issue? What issues would you like to see discussed in upcoming bulletins? Modeling & Simulation? Homeland Defense/ Homeland Security? Space Survivability Issues? Unmanned Aerial Systems? Please e-mail your comments to surviac@bah.com.

Campaign Analysis continued from page 1.

characterize future systems and effects. Some of these portrayed systems are projected acquisitions, such as the F-35 in all of its variations; some are advanced technology concepts such as combat focused unmanned platforms. These future systems and concepts will need some examination in terms of survivability and vulnerability, over many days and across mission areas.

Campaign modeling has untapped potential to examine issues relating to survivability and vulnerability. As an example, consider impacts of vulnerability on sortie generation. While aircraft can return home if damaged, how quickly can those aircraft be repaired and turned around to fly another day? This could be a driving issue of using F-35 platforms in a Close Air Support (CAS) role. Repairing the platform's stealthy composite skin could have unreasonable repair times for combat turnaround. Do these platforms become "CAS dedicated" and continue to fly with a violated signature, or do they sit multiple days—perhaps weeks—to attain full signature restoration? These are questions campaign analysis can help answer, conducting tradeoffs in a campaign model looking at concept of operations, missions, repair times, and desired sortie generation, just to name a few.

Trading off a variety of factors to determine drivers in measures of success does not have to be focused on known future platforms. Capturing the effect of having the concept in place can provide insights to warfighter benefits. If 'desirements' for a future system's performance are defined, then consider what the desired effects of those desirements will be. Consider as an example a concept self-defense system for an aircraft, where the desire is to determine the military payoff of such a system being X% effective. As opposed to explicitly creating some glamorous countermeasure concept through a lot of design and coding in the campaign model, consider reducing air defense probabilities of kill against the conceptually equipped aircraft by X% to mimic the desired effect. If the 'system effect' has a positive impact (as opposed to a baseline case) and provides beneficial indirect effects (such as faster target set drawdown), then the concept of such a system will show potential and have justification to be pursued.

Getting to the campaign level "military payoff" of future concepts, as well as present day and near term acquisitions, good engineering, engagement, and mission level analysis is essential for calibration and "rolling up" for credibility and consistency. Surface to Air probabilities of kill (Pk) derived through using models like ESAMS and RADGUNS is an important part of ensuring air campaign air defense behavior plays out appropriately. Modeling communication networks with tools built for that purpose can be leveraged to set processing, exploitation, and dissemination (PEDs) of

information delays. Process modeling tools which can capture the maintenance process can assist in setting maintenance repair times and frequency. Even referencing other campaign models containing more detail in a functional area common to both models may be useful as well.

While system performance consistency across the M&S spectrum is critical to delivering good output data, determining the best metrics to examine in support of a study should be done separate from the model. Campaign models produce hundreds of outputs, and knowing which ones to examine should be driven by the key critical issue research questions defined before even touching a model. Doing so will avert the critical issues being at the mercy of the model, when the model should be at the mercy of the critical issues. Chances are the campaign model will not address every metric of interest, but by charting metrics needs both decision makers and analysts can gain confidence the model will address the more important ones ... If the model doesn't, then consider a different model, or a different approach.

With metrics in hand, a campaign analysis can "begin with the end in mind" to determine the visualization of results. Quite the variety exists to picture campaign level outcomes:

- **Maps** to highlight results of ground force operations and destruction of strategic targets from the air. Campaign models can provide interactive maps which display information of interest (SAM rings, RADAR sites, road networks, etc.), replay the scenario to watch how actions play out (Figure 1),



Figure 1. An example map from an unclassified STORM scenario

- **Tables** to highlight results of target type kills and US/ Allied asset losses,
- **Graphs** in the various formats (line, bar, pie) to highlight daily and/or cumulative results of combat (Figure 2),

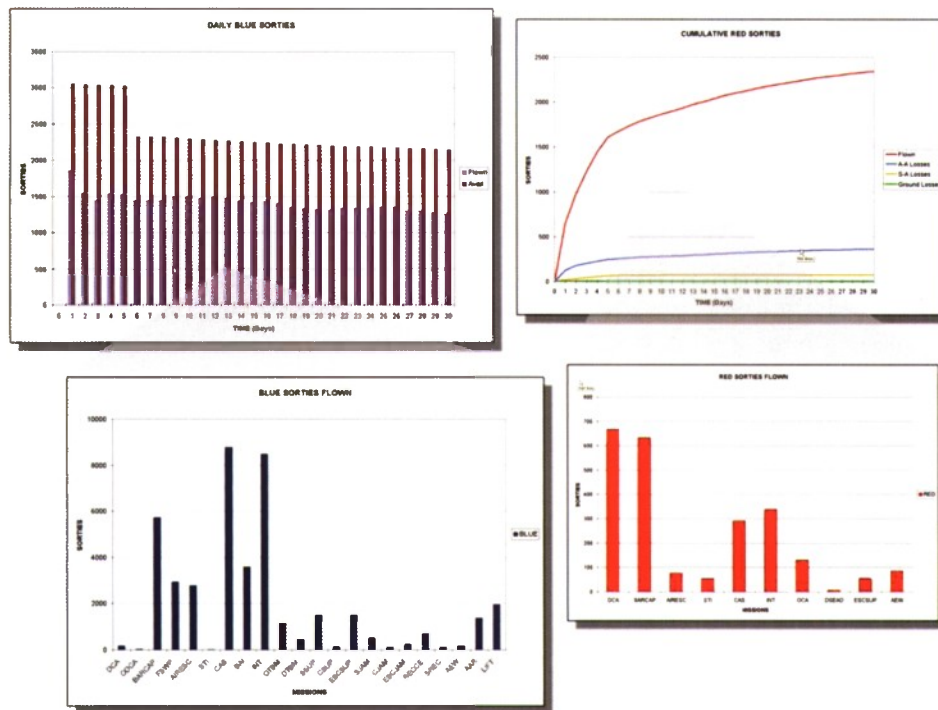


Figure 2. Graphs can provide information in terms of systems and missions, over time by day or cumulative over the campaign

- **Composite/Hybrids** which display “roll-ups” of outputs to address effectiveness to achieve a desired level of performance (and may use color coding),
- **Others** – Be Creative! The bottom line is to communicate the results effectively. If the greatest analysis in the world can't be communicated, then no one will ever know.

Among the presentation methods, the idea of a composite/hybrid is one which may best address the need of analyzing a “system of systems”. In a campaign analysis context, the “system of systems” is the Joint and Allied force. How well that “system of systems” achieves objectives will be a balance of resource allocation and risk. To visualize the contribution of these factors, there is a “Campaign Capability View”, or CCV (Figure 3), to show how metrics which deal with kills and losses interact with others to address objectives through system agnostic operational capabilities.

Whether viewing as a system of system or simply comparing results based on system changes, campaign analysis can highlight differences over a period of days to months, across a variety of mission areas. Campaign models used by each of the services are especially suited to exploring direct and indirect impacts of survivability and lethality, and capable of addressing the indirect impacts of vulnerability. While campaign analysis can be a means of obtaining top tier insights, those results will not be observed without good visualization and interpretation of results, which comes from the most valuable asset of any campaign analysis: the analyst.

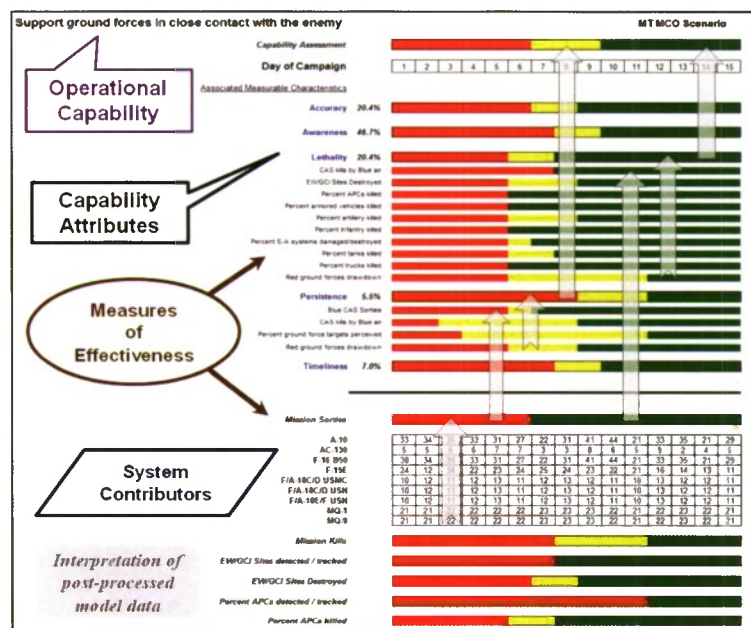


Figure 3. The “Campaign Capability View” is a composite representation of campaign outcomes developed by the author

ABOUT THE AUTHOR:

Ryan Farmer has over 15 years experience in Air Force studies and analyses, many of those years associated with conducting campaign analysis. As an Air Force Captain, he supported Headquarters Air Combat Command and Aeronautical Systems Center using the model THUNDER. As a consultant with Booz Allen Hamilton, Ryan has supported Air Force Research Laboratory (AFRL) Plans and Programs using the model STORM and has led campaign-level analyses to explore operational benefit of future technologies for AFRL's propulsion and air vehicles directorates. He can be contacted at (937) 781-2821 or farmer_ryan@bah.com.

Collaboration is key to success by Jessica Jones, DTIC

The Department of Defense (DoD) has embraced the Web 2.0 evolution and launched its own wiki site – DoDTechipedia. This online collaborative encyclopedia for the science and technology (S&T) community, is similar to Wikipedia or Intellipedia (a wiki-based site for the United States intelligence community). With its launch in October 2008, as a joint project of the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L), Director, Defense Research and Engineering (DDR&E), Defense Technical Information Center (DTIC), Networks and Information Integration and Department of Defense Chief Information Officer (NII/DoD-CIO), and Rapid Reaction Technology Office (RRTO), DoDTechipedia aims to foster communication and collaboration with greater transparency among DoD scientists, engineers, the acquisition community, and operational warfighters.

“This tool enables DoD personnel to collaborate on technological solutions, reduce costs, add capability and avoid duplication. DoDTechipedia aids in the rapid development of technology and the discovery of innovative solutions to meet

critical capability needs and gaps,” states Christopher Thomas, DTIC Chief Technology Officer.

DoDTechipedia is available to DoD, federal government employees and their contractors with a Common Access Card (CAC) or DTIC registration (<https://register.dtic.mil/wobin/WebObjects/RegLite?SiteID=Wiki>). Although this wiki site is limited access, it contains unclassified information only. A classified version of DoDTechipedia is also available for SIPRNet users to collaborate in a secure environment.

DoDTechipedia is truly a collaborative effort and every contribution counts to ensure this collective knowledge base expands. Users are encouraged to participate by creating a page, asking a question, starting a blog or posting events relative to their organization or area of expertise on the site. “Gardening,” performing small edits on wiki content to improve its overall quality and helping cultivate interaction and participation within the community of users, is also encouraged.

To get started, visit <https://www.dodtechipedia.mil> and complete the short registration process today. Have no fear if wikis are a new concept to you, help is available. Tutorials are posted on the site to aid you with each aspect of getting started. DoDTechipedia workshops, hands-on training sessions, are offered in several formats including an online webinar; if you are interested in attending a workshop or webinar, please contact Ms. Jessica Jones with DTIC Marketing at 703.767.8216 or marketing@dtic.mil.



The role of standards and standardization in unmanned aircraft systems airspace integration

by John Burns, NAVAIR Orlando TSD, Christin Capriglione, NAVAIR Orlando TSD, Katherine Muse Duma, Booz Allen Hamilton,

Unmanned aerial systems have proven their value in a wide number of missions and functions, however, their employment has been constrained in the U.S. by FAA safety restrictions. To address this for the future the Department of Defense (DoD) intends to gain “file and fly” access to the National Airspace System (NAS) for Unmanned Aircraft Systems (UAS) by the year 2015. To achieve UAS Airspace Integration (AI), DoD must work with the FAA to identify requirements for UAS operations that will allow for less-restrictive operations in the NAS without compromising the safety of the flying public and residents on the ground.

From the FAA perspective, restrictions on UAS operations are necessary to maintain the safety of the NAS until DoD can prove that UAS possess the same operational capabilities as manned aircraft. The human component of the UAS plays a significant role in enabling these operational capabilities and if not systematically designed into the system, will be a potential source of failure. A main consideration, then, becomes addressing human performance challenges in facilitating airspace integration for existing and future UAS. One means to address human performance challenges to UAS AI is the application and/or modification of standards and the standardization of processes to ensure that the acquisition and operation of future UAS achieve DoD missions without compromising NAS safety.

Using current processes, human performance issues are often identified after the conceptualization and initial development of a system which can impose additional costs in the form of equipment modification/additions that are more expensive as they come late in implementation, additional training, additional manpower, or acceptance of less capability than originally intended. These compromises may impact UAS capabilities with respect to following established NAS operating standards, policies, and procedures, creating a complex situation in which human performance challenges affect UAS operational capabilities and DoD’s ability to optimize UAS operations within domestic airspace for mission effectiveness.

To begin addressing these challenges, we composed two reports that (1) identified human performance challenges within the different phases of UAS flight; and (2) examined standards, guidance, and policy that currently exist to sup-

port human performance integration in UAS operations and acquisitions.

An examination of the different phases of UAS flight revealed similar human performance challenges to those that arise in manned flight. Situational awareness, physical and cognitive workload, communication and system latency, human computer interface issues, training, interoperability, and manpower as well as multi-aircraft control (which is unique to future UAS operations) were all found to be challenges to individual human capabilities and performance.

Additionally, several systemic factors impact human performance in UAS operations, including stakeholder communication; interoperability; return on investment considerations related to system development; and acquisition processes and associated design standards and guidance. Both individual and systemic human performance challenges may be addressed by application of standards and guidance during systems engineering and acquisition processes.

The second report aimed to investigate this topic and identify the role of Human Systems Integration (HSI) in the systems engineering process. Through review of standards and related literature, several themes emerged:

- DoD and individual Services utilize a variety of standards and guidance documents to address human performance considerations, but do not share one consistent definition of HSI and its applications.
- Guidance documentation and standards do not provide defined measures and methodologies for capturing human performance data or qualifying human performance challenges.
- Guidance for integrating human performance considerations into systems engineering processes does not clearly indicate means to identify the HSI domains that are relevant to a specific program, tools to assess each domain, nor when to apply tools within the acquisition lifecycle for optimal benefit.
- More extensive analyses of standards and guidance documentation, human performance gaps within them,

- and identification of human performance measures should provide a more complete understanding of specific actions to guide the development of future UAS for NAS operations.

To achieve UAS AI “file and fly,” the findings thus far suggest the following next steps from a DoD perspective:

- Within DoD, establish shared definitions, standards, and guidance for HSI integration and application.
- Working with FAA, use available standards and guidance documentation to develop consistent shared processes for the design, development, and operation of future UAS and ensure that human performance requirements are adequately addressed.
- Together with FAA, establish standardized, repeatable processes for certifying UAS airworthiness and pilot/operator qualifications across entities to determine what is appropriate to match the desires of both the FAA and DoD.

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REFERENCES

Unmanned Aircraft Systems Airspace Integration Joint Integration Product Team. (2007). *Unmanned Aircraft System Airspace Integration Joint Integrated Product Team: Concept of Operations, Version 0.4*. Unpublished draft.

Unmanned Aircraft Systems Airspace Integration Joint Integration Product Team. (2007). *Integrating Human Systems Integration (HSI) into the Systems Engineering (SE) Process, Version 0.2*. Unpublished draft.

Unmanned Aircraft Systems Airspace Integration Joint Integration Product Team. (2007). *Unmanned Aircraft Systems in the National Airspace System: Human Performance Issues, Version 0.2*. Unpublished draft.

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MANPADS

Miss Distance Assessment

by Jaime Bestard, 780 TS

Radar and laser trackers are commonly used to quantify Man-Portable Air-Defense Systems (MANPADS) missile position information throughout the fly-out (i.e. missile trajectory). Accuracy of these measurements in the endgame remains an issue. Video-stereography, in collaboration with radar and/or laser trackers provides visually-verifiable miss distances. The 780th Test Squadron (780 TS) at Wright-Patterson Air Force Base (WPAFB) has published a report on the application of video-stereography to obtain MANPADS miss distances. This report is available from the Defense Technical Information Center (DTIC).



The miss distance data were recorded alongside contributing factors such as missile type, launch range, and other environmental conditions.

Data were obtained on a non-interference basis during more than 300 shots conducted to assess missile warning systems (MWS), jammers, and other missile performance characteristics. Miss distances were quantified through a combination of video imagery, radar trackers, and laser trackers. Multi-view video imagery was combined through stereography to yield high-fidelity miss distance measurements for un-jammed missiles passing near the target array. Radar and laser trackers (when present) captured miss distances for all launches including jammed missiles and those that passed farther from the target array (outside the video field-of-view). Data were assimilated into a MANPADS Miss Distance Database that contains video, radar, and laser-tracker derived miss distances for jammed and un-jammed systems. The database is setup to allow user-defined queries that assess miss distance as a function of missile type, jamming, data-capture method, launch range, launch time, target position, super-elevation, ozone concentration, visibility, cloud cover, and crosswind velocity. Data stochastically quantify each missile's ability to track stationary targets and can be used to identify outliers during future tests. Data will be used to verify the credibility of fly-out and endgame models used to predict hit-points for the aircraft Live Fire Test and Evaluation (LFT&E) community.

For more information please contact Mr. Jaime Bestard, (937) 255-6302 x231, E-mail: jaime.bestard@wpafb.af.mil.

2009 NDIA CSD Aircraft Survivability Awards and Presentations

By Dennis Lindell, Joint Aircraft Survivability Program Office

The National Defense Industrial Association's (NDIA) Combat Survivability Division (CSD) held its annual Aircraft Survivability Symposium at the Naval Postgraduate School (NPS) on 3-6 November 2009. The Aircraft Survivability 2009 theme was, "Next Generation Requirements." As the theme implies, the symposium explored new approaches to integrate and balance aircraft survivability for today's war on terrorism, while remaining prepared for future high-intensity conflicts. The Keynote Speakers were Lt Gen David A. Deptula, USAF, Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance, and Mr. Charles (Tom) Burbage, Executive Vice President and General Manager, F-35 Program Integration, Lockheed Martin Corporation. NDIA CSD Awards The NDIA CSD Awards are presented annually at the Aircraft Survivability Symposium. These awards recognize individuals or teams demonstrating superior performance across the entire spectrum of survivability, including susceptibility reduction, vulnerability reduction, and related modeling and simulation.

The Admiral Robert H. Gormley Leadership Award, named in honor of the CSD's founder and Chairman Emeritus, was presented to Mr. Alan D. Bernard, Massachusetts Institute of Technology, Lincoln Laboratory. The NDIA Combat Survivability Award for Technical Achievement was presented to Mr. Larry F. Pellett, Lockheed Martin Aeronautics. The presentations were made by Mr. Robert Palazzo, CSD Awards Committee Chairman, Dr. Frank Swehosky, 2009 Symposium Chairman, BG Stephen D. Mundt, USA (Ret), CSD Chairman, and RADM Robert H. Gormley, USN (Ret), CSD Chairman Emeritus.

ADMIRAL ROBERT H. GORMLEY LEADERSHIP AWARD

The Admiral Robert H. Gormley Leadership Award is presented annually to a person who has made major leadership contributions to combat survivability. The individual selected must have demonstrated outstanding leadership in enhancing the overall discipline of combat survivability, or played a significant role in a major aspect of survivability design, program management, research and development, modeling and simulation, test and evaluation, education, or the development of standards. The emphasis of the award is on demonstrated superior leadership over an extended period. The 2009 Admiral Robert H. Gormley Leadership Award was presented to Mr. Alan D. Bernard, MIT Lincoln Laboratory. The citation read,

"Mr. Alan Bernard is recognized for exceptional and sustained leadership in the field of aircraft combat survivability. His 46 years of industry and DoD experience span the areas of research, development, test and evaluation, as well as operational assessments. He is nationally recognized for his contributions to the aircraft survivability field, including stealth and electronic warfare. Mr. Bernard has held leadership positions of increasing scope and importance at Lincoln Laboratory. He was the Leader of the Systems Analysis Group supporting the Air Force SAF/AQL "Red Team" activities, evaluating stealth, electronic countermeasures, weapons technologies, capabilities and vulnerabilities. He was a pioneer in using systems analysis to understand the interactions of survivability and technology which helped define the iconic Red vs. Blue "Kill Chain" frame work. In addition, Mr. Bernard has been involved in almost every USAF aircraft and weapons program in the last 30 years, such as the F-117, B-2, F-22, F-35, Dark Star, Predator, Global Hawk, Advanced Cruise Missile, Joint Air-to-Surface Standoff Missile and numerous other unacknowledged programs. Presently, the Associate Division Head of Lincoln Laboratory's Tactical Technology Division, Mr. Bernard is responsible for the technical operation of the technical staff, who provide research and analysis for the U.S. Military to include "Red Team" analyses in support of the Air Force's Rapid Capabilities Office on their efforts in a wide variety of classified technology and mission areas.

The 2009 Admiral Robert H. Gormley Leadership Award acknowledges the exceptional and visionary contributions of Mr. Alan D. Bernard to aircraft combat survivability, the Armed Forces and the nation."



Admiral Robert H. Gormley Leadership Award: From left to right – Dr. Frank Swehosky, 2009 Symposium Chairman; BG Stephen D. Mundt, USA (Ret), CSD Chairman; Mr. Alan D. Bernard, MIT Lincoln Laboratory, Admiral Robert H. Gormley Leadership Award recipient; and RADM Robert H. Gormley, USN (Ret), CSD Chairman Emeritus.

COMBAT SURVIVABILITY AWARD FOR TECHNICAL ACHIEVEMENT

The NDIA Combat Survivability Award for Technical Achievement is presented annually to a person or team who has made a significant technical contribution to any aspect of survivability. It may be presented for a specific achievement or for exceptional technical performance over a prolonged period. Individuals at any level of experience are eligible for this award. The 2009 Technical Achievement Award was presented to Mr. Larry F. Pellett, Lockheed Martin Corporation. The citation read,

"Mr. Larry Pellett is recognized for exceptional technical achievement in the field of aircraft combat survivability. Over the past 25 years, he has made significant contributions in the development of highly survivable weapon system designs, sensor integration and system testing. He pioneered efforts in radar cross-section testing and the development of a unique indoor RCS test capability, the first of its kind in the country. Mr. Pellett became the key driver in the development of a new compact range test facility at Rye Canyon and directed improvement to the world's premier outdoor range facility at Helendale, CA. He has held many key positions at Lockheed Martin Aeronautics, to include Chief of the Electro-Magnetics Division where he led technology development on advanced radomes, antennas, ranges and measurement systems, and special materials. Mr. Pellett was the Skunk Works lead on the F-22 program focused on the Management and Survivability Organization managing over 350 engineers and scientists at three sites across the country. Mr. Pellett has demonstrated exemplary technical skills in the field of aircraft survivability, having been instrumental to the success of the F-22, F-35, F-117 and many other Advanced Development Programs.

This award for Technical Achievement acknowledges the exceptional and visionary contributions of Mr. Larry Pellett to aircraft combat survivability, the Armed Forces and the nation."



Combat Survivability Award for Technical Achievement: From left to right – Dr. Frank Swehosky, 2009 Symposium Chairman; BG Stephen D. Mundt, USA (Ret), CSD Chairman; Mr. Larry F. Pellett, Technical Achievement Award recipient; and RADM Robert H. Gormley, USN (Ret), CSD Chairman Emeritus.

WARFIGHTER PRESENTATION TO DR. ROBERT E. BALL

At the end of his welcome and opening remarks to the symposium, VADM Daniel T. Oliver, USN (Ret), President of the Naval Postgraduate School, called NPS Alumnus LCDR Stephen D. Nordel, USNR, BG Stephen D. Mundt, USA (Ret), CSD Chairman, CDR Christopher Adams, USN (Ret), Director of the NPS Center for Survivability and Lethality, and NPS Distinguished Professor Emeritus, Dr. Robert E. Ball to the stage for a presentation. As many know, Professor Ball is a living legend in the aircraft survivability community. He originated the Aircraft Combat Survivability education program at NPS in the late 70's, wrote the 1985 and 2003 AIAA textbooks on the fundamentals of aircraft combat survivability analysis and design, and taught some 4,000 military, civilian and industry students over two decades.

President Oliver, General Mundt, CDR Adams and LCDR Nordel, a thesis student of Professor Ball, presented Professor Ball with an American Flag that had been flown over Iraq by LCDR Nordel on behalf of military aviators around the world, the aircraft survivability community, and the NPS Center for Survivability and Lethality for his lifetime of work and achievement in enhancing the Aircraft Combat Survivability discipline. The citation read,

"On January 15, 2008, Marine Tactical Electronic Warfare Squadron 4 deployed to Marine Corps Air Station Al Asad, Iraq in support of Operation IRAQI FREEDOM. The dedication and steadfastness of the "Seabawks" in their continuing support of the Global War on Terror is playing a crucial role in the establishment of a free and democratic Iraq. On April 25, 2008, this American flag was flown into combat in an EA-6B Prowler during Operation IRAQI FREEDOM 06-08 for Dr. Robert E. Ball for your lifetime commitment to the protection of our lives and aircraft. The mission originated from Marine Corps Air Station Al Asad and was conducted in Iraqi airspace for the duration of the flight. During the 5.3 hour mission, Sancho 32 provided electronic warfare protection and support for coalition ground units engaged by insurgents trying to destabilize the newly formed Iraqi government."



Dr. Ball with citation and the American flag flown over Iraq.

BEST POSTER PAPERS

Awards were also presented for the symposium's top three poster papers. First place went to Mr. David Sparks of Bell Helicopter for his paper, "Understanding Asymmetric Acoustic & Visual Threats to Rotorcraft." Second place went to Mr. Pat Buckley of SURVICE Engineering for his paper, "Shotline Processing on Multi-Core Processors." Third place

Aircraft Survivability Awards continued from page 9.

went to Mr. Ed Pevler of Southwest Research Institute for his paper, "Analysis of RF Terrorism Theory Compared to Unusual Aviation Incidents – Have We Been Attacked?"



From left to right – Dr. Frank Swehosky, 2009 Symposium Chairman, Mr. Michael Schuck for Mr. Pat Buckley, Mr. Ed Pevler, Mr. David Sparks and Mr. Ron Dexter, Displays and Poster Paper Chairman.

AIRCRAFT SURVIVABILITY 2010

Preparations are underway for Aircraft Survivability 2010, "Today's Successes, Tomorrow's Challenges." Scheduled for 2-5 November 2010, this important event will highlight government, industry, academia and military successes in enhancing combat aircraft survivability and explore applying the lessons learned to future requirements and challenges. Details regarding the 2010 Symposium Call for Abstracts, Displays and Award Nominations will be available on the event web-site: <http://www.ndia.org/meetings/1940>.

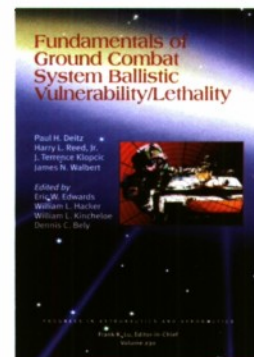
If you're in the Survivability Business, Monterey is the Place to be in November!

ABOUT THE AUTHOR

Dennis Lindell is a member of the NDIA CSD Executive Board. He is also the manager of the Joint Aircraft Survivability Program and one of two Army representatives in the program office.

Fundamentals of Ground Combat System Ballistic Vulnerability/Lethality

With contributions from more than 50 vulnerability/lethality (V/L) professionals in Government and industry, this 300-page text provides a comprehensive look at the basic history, terminology, processes, tools, and applications associated with the V/L discipline. It's intended to serve as both a foundational textbook for new V/L analysts, testers, developers, researchers, and scientists as well as a ready-reference for those practitioners already working in the field.



The book's major themes include:

- The history of V/L analysis
- The role of V/L in materiel design, development, and acquisition
- The V/L analysis process
- The Missions and Means Framework
- Initial representation
- Damage mechanisms
- Component dysfunction
- Personnel vulnerability
- Wound ballistics
- Target response
- Tactical utility
- Vulnerability assessment
- Measures of effectiveness
- Fault trees and degraded states
- Networked systems
- Modeling and simulation tools and methods
- Verification, validation, and accreditation
- System acquisition and life cycle issues
- Vulnerability reduction
- Tactics and doctrine.

Also included are an extensive bibliography and appendices that provide more in-depth discussions on fragment penetration, behind-armor debris characterization, PCDJH estimation, and applied VV&A processes.

For information on obtaining this book, Government employees may contact A.J. Brown, SURVIAC, (937) 255-3828 ext. 284. All others may obtain this book through AIAA, 800.682.2422, www.aiaa.org.

Aircraft Combat Damage Reporting Workshop held

On 20 August 2009, the National Defense Industrial Association's (NDIA) Combat Survivability Division (CSD) conducted a workshop on Aircraft Combat Damage Reporting (CDR). The Institute for Defense Analyses (IDA) hosted the workshop at their facility in Alexandria, Virginia. The workshop was sponsored by the Deputy Director, Operational Test & Evaluation/Live Fire Test & Evaluation (DDOT&E/LFT&E). Leading experts on aircraft survivability and key figures in the DoD acquisition community participated in the workshop. Background information on aircraft combat damage reporting, use and improvement was presented and discussed.

The objectives of this workshop were:

- 1) Identify current gaps in the DoD and Armed Services processes for collecting and sharing aircraft combat damage information,
- 2) Develop recommendations for aircraft combat damage data collection and reporting across the Services, without imposing burdensome reporting requirements on the warfighter, and
- 3) Develop recommendations

for an OSD level aircraft combat damage reporting system that provides timely, accurate, consistent and complete information on U.S. military aircraft combat damage across all services and areas of operation.

The workshop was planned and organized on three premises:

- Combat damage data is critical to learning what does and doesn't work, to improve tactics, to enhance the survivability of future weapon system design, and to reduce casualties
- Combat damage reporting consistency and comprehensiveness can be improved across the services while balancing a minimal reporting burden on the warfighter
- Now is the time to institute change.

It was unanimously agreed that combat damage data is absolutely valuable and essential for understanding the performance of aircraft survivability features in combat. The data serves as a baseline for validation of current survivability designs and development of solutions

for vulnerability and susceptibility issues. The increased survivability of U.S. aviation platforms is directly attributable to the knowledge gained through combat damage data collection. The need to institutionalize the collection and use of combat damage data is acute. It is important that a simple and accessible reporting process is institutionalized across the DoD so there is a robust capability to support current and future operations.

The participants developed a set of findings and recommendations for improving future aircraft combat damage reporting. The summary report for this workshop is currently being coordinated within DoD. A separate report containing minutes of the workshop and all attached presentations is available from SURVIAC.

For more information please contact Kevin Crosthwaite, SURVIAC Director, (937) 255-3828 x279, DSN: 785-3828, or by e-mail: crosthwaite_kevin@bah.com.



ESAMS 4.1 now available through SURVIAC

SURVIAC has begun distributing the newest version of the Enhanced Surface-to-Air Missile Simulation (ESAMS) 4.1. This program and its upgrades were funded by the Joint Aircraft Survivability Program Office (JASPO) and were developed by ASC/ENDA.

The new version of ESAMS 4.1 model is an upgrade of ESAMS 4.0. Upgrades were made to the missiles, radars, and other systems within the model. ESAMS is a digital computer program used to model the interaction between a single airborne target and a surface-to-air missile (SAM) air defense system. The user may individually specify each site's location, or have ESAMS arrange

sites in rectangular, concentric circles, or semi-circles. The model details the characteristics of both ground and missile seeker radar. ESAMS models aircraft from their signature data and optional vulnerability data. This simulation provides a one-on-one framework used to evaluate air vehicle survivability and tactics optimization. ESAMS can execute simple, straight and level, or complex flight paths.

Supported Platforms:

- 1) SUN
- 2) PC – Compaq Compiler and Intel Visual FORTRAN
- 3) Linux – Portland Compiler

ESAMS Training:

If you or your company is interested in ESAMS training, please contact Paul Jeng at (937) 255-3828 x273 (DSN: 785-3828 x273) for more information.

You can obtain the new version of ESAMS 4.1 from SURVIAC.

SURVIAC can be reached at (937) 255-3828, DSN 785-3828. Order requests should be directed to Mr. AJ Brown at 937-255-3828 x284 (DSN: 785-3828 x284), e-mail: brown_aj@bah.com while technical questions should be directed to Mr. Barry Vincent at (937) 781-2456, e-mail: vincent_barry@bah.com.

Date set for the next JASP Aircraft Combat Survivability Short Course

The Joint Aircraft Survivability Program (JASP) will conduct the next Aircraft Combat Survivability Short Course on 4-7 May 2010 at the Naval Postgraduate School in Monterey, California. This 4-day workshop is open to DoD government and industry personnel who are interested in learning more about the aircraft combat survivability discipline. This course is a familiarization in aircraft combat survivability. It is suitable for engineers and other personnel involved in aviation-related programs. Topics include:

- Introduction to survivability
- Historical and current survivability combat loss data
- Survivability methodology – assessment / enhancement
- Modeling and simulations for survivability
- Mission and campaign survivability analysis
- IR, Radar, and EW fundamentals
- Current Susceptibility Reduction technology
- Current Vulnerability Reduction technology
- Joint Live Fire and Live Fire Test programs
- Personnel casualties and safety
- Current survivability initiatives

Students will receive a complimentary copy of Dr. Robert E. Ball's text *The Fundamentals of Aircraft Combat Survivability Analysis and Design*, 2nd Edition. The students also earn 2.7 Continuing Education Units (CEUs) towards their professional development.

Registration information is available at: <http://www.bahdayton.com/jaspsc> or contact:

Mr. Paul Jeng, SURVIAC
(937) 255-3828 ext. 273
DSN: 785-3828 x273
E-mail: jeng_paul@bah.com

NPS point of contact & lead instructor:
Prof Chris Adams
(831) 656-3400
E-mail: caadams@nps.edu

Cost is \$750 for U.S. Government/military and \$1000 for industry.

Models Distributed by SURVIAC

The Survivability/Vulnerability Information Analysis Center (SURVIAC) is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Technical Information Center (DTIC)

Acronym	Model Name	Version No.
AIRADE	Airborne Radar Detection Model	7.4
ALARM	Advanced Low Altitude Radar Model (Includes EARCE 2.5)	5.2
BLUEMAX 5	Variable Airspeed Flight Path Generator	1.0.2
BRAWLER	Air-to-Air Combat Simulation	7.1
*BRL-CAD	Ballistic Research Laboratory Computer-Aided Design Package	7.14.8
**COVART	Computation of Vulnerable Area Tool	6.0
ESAMS	Enhanced Surface-to-Air Missile Simulation	4.1
**FASTGEN	Fast Shotline Generator	6.0
FATEPEN	Fast Air Target Encounter Penetration Program	3.0.0
IVIEW 2000	Graphical User Interface for Output Simulation	1.0E
JSEM	Joint Service Endgame Model	1
LELAWS	Low Energy Laser Weapons Simulation	3.0
RADGUNS	Radar-Directed Gun System Simulation	2.4.1

* For more information regarding BRL-CAD documentation contact Mr. Dwayne Kregel at the SURVIAC Aberdeen Satellite Office, (410) 273-7722.

** Model is part of the Vulnerability Tool Kit

For further information on how to obtain these models and how to establish need-to-know certification, please contact SURVIAC at (937) 255-3828 ext. 284 or DSN 785-3828 ext. 284. Requests from non-U.S. Agencies must be forwarded to their country's Embassy in Washington, DC, Attention: Air Attache's Office.

Aircraft Combat Survivability Self Study Program

SURVIAC is pleased to announce the availability of the Aircraft Combat Survivability Self Study Program, SSSP. The SSSP has been funded by the Joint Aircraft Survivability Program (JASP) and was developed by Distinguished Professor Emeritus Dr. Robert E. Ball. Nearly all of the material in the program has been taken from the Prologue and Chapter 1 of the textbook "The Fundamentals of Aircraft Combat Survivability Analysis and Design, Second Edition," written by Dr. Ball and published by the American Institute of Aeronautics and Astronautics (AIAA) in late 2003.

The SSSP is available for free downloading from the SURVIAC website at:
<http://www.bahdayton.com/surviac/survabilityeducation.htm>.

You may also request a CD containing all four versions free of charge by using the inquiry form located at
<http://www.bahdayton.com/surviac/inquiry.aspx>.

JMUM 2010

15-17 June 2010 • Colorado Springs, CO

The 15th annual JASP Model Users Meeting (JMUM) will be held 15-17 June 2010 at the U.S. Air Force Academy, Colorado Springs, Colorado. This meeting funded by the Joint Aircraft Survivability Program, JASP, and executed by SURVIAC is for those who are interested in the JMUM model suite which includes ESAMS, FASTGEN, COVART, BRAWLER, as well as many other models. The layout of JMUM includes one and a half day of general session, followed by one and a half day of breakout sessions. JMUM is an excellent networking event for the JASP and SURVIAC models users. The meeting promotes openly discussing hardware and software issues related to each of the JMUM models as well as other DoD survivability/vulnerability models.

Contact Paul Jeng, SURVIAC, (937) 255-3828 x273 or e-mail jeng_paul@bah.com.

Products Distributed by SURVIAC

The Survivability/Vulnerability Information Analysis Center (SURVIAC) is a U.S. Department of Defense Information Analysis Center (IAC)
sponsored by the Defense Technical Information Center (DTIC)

Product	Cost
A Critical Review of Graphite Epoxy Laser Damage Studies	Free
A Summary of Aerospace Vehicle Computerized Geometric Descriptions for For Vulnerability Analyses	Free
Advanced Materials for Enhanced Survivability	Free
Aircraft Combat Survivability Self Study Program (SSSP) CD (or download from SURVIAC website)	Free
Aircraft Fuel System Fire and Explosion Suppression Design Guide	Free
"Aircraft Survivability" Video	Free
Alternatives for Halon 1301 in Ground Vehicle Firefighting Systems	\$ 50.00
An Overview of Laser Technology and Applications	Free
An Overview of Laser-Induced Eye Effects	Free
Aircraft Asymmetric Threat Survivability Workshop Summary Report	Free
Aircraft Asymmetric Threat Survivability Workshop Report (Full Report)	\$ 50.00
"Battle Damage Repair of Composite Structures" Video	Free
Collection of Vulnerability Test Results for Typical Aircraft Systems and Components	\$ 75.00
Comparative Close Air Support Vulnerability Assessment Study - Executive Summary	Free
Component Vulnerability Workshop Component Pd/h Handbook	\$200.00 (Free to Gov't)
Component Vulnerability Analysis Archive (CVAA) and Workshop Notes	\$300.00 (Free to Gov't)
Component Vulnerability Database Development	Free
Computerized Geometric Information to Support Vulnerability Assessments State-of-the-Art Report	\$ 75.00
Continuity of Operations (COOP) State-of-the-Art Report (SOAR)	\$ 50.00
Countermeasures Handbook for Aircraft Survivability	Free
Critical Review and Technology Assessment (CRTA) for Soldier Survivability (Ssv)	Free
"Designing for Survivability" Video	Free
Directed Energy Effectiveness Modeling State-of-the-Art Report (SOAR)	\$ 50.00
DREAM Sensitivity Study	\$ 50.00
"Fundamentals of Ground Combat System Ballistic Vulnerability/Lethality" by Dr. Paul Deitz	Free - Gov't only*
Gas Explosion Suppression Agent Investigation	\$200.00
Joint Aircraft Survivability Program (JASP) Promotional Video	Free
Lessons Learned from Live Fire Testing	\$ 50.00 (Free to Gov't)
MANPADS Threats to Aircraft: A Vulnerability Perspective, February 2000, Final Report	\$200.00
Missile Warhead Bomb and Propellant Response State-of-the-Art Report (SOAR)	\$ 50.00
MOSAIC Sensitivity Study	\$ 50.00
Munition Response State-of-the-Art Report (SOAR)	\$ 50.00
National MANPADS Workshop: A Vulnerability Perspective, Proceedings - 2 volumes	\$200.00
Night Vision Goggle (NVG) Rocket Propelled Grenade (RPG) Quick Look Report (QLR) CD	\$ 50.00 (Free to Gov't)
Penetration Characteristics for Advanced Engine Materials	Free
Proceedings of the Eighth DoD Conference on DEW Vulnerability, Survivability, and Effects - 2 Volumes	\$100.00 / per set
RADGUNS 1.8 Parametric Study	\$100.00 (Free to Gov't)
Ship Survivability Overview	Free
SOAR on Directed Energy Weapon (DEW) Assessment Methods	\$ 50.00
State-of-the-Art (SOAR) for Non-Lethal Weapon (NLW) Assessment Methodologies	\$ 50.00
"SURVIAC - A Capabilities Overview" Video	Free
SURVIAC Model Guide	Free
Survivability Analysis Workshop Notebook 2005	\$100.00
"The Fundamentals of Aircraft Combat Survivability Analysis and Design" second edition, by Robert E. Ball	Free - Gov't Only*
"Threat Effects in Aircraft Combat Survivability" Video (2006)	\$ 50.00 (Free to Gov't)
UAV Survivability Enhancement Workshop Summary Report	Free
UAV Survivability Enhancement Workshop Report	\$ 50.00
Vulnerability Reduction Workshop Summary Report	Free

Calendar of Events

FEBRUARY 2010

Heli-Expo 2010

20-23 Feb 2010

Houston, TX

POC: AAAA, (203) 268-2450, www.quad-a.org

AFCEA's 9th Annual Homeland Security Conference "DHS - The 7-Year Itch - Renewing the Commitment"

24-25 Feb 2010

Washington, DC

AFCEA, (800) 336-4583, www.afcea.org/events

AUSA Winter Symposium

24-26 Feb 2010

Fort Lauderdale, FL

POC: AAAA, (203) 268-2450, www.quad-a.org

MARCH 2010

4th Annual Naval Expeditionary Forces Symposium and Expo 2010 (NavExFor)

1-3 Mar 2010

Virginia Beach, VA

POC: Lodestar Group, (919) 573-6108

<http://defenseptradeshows.com/navexfor-2010/>

26th Annual National Test & Evaluation Conference

1-4 March 2010

San Diego, CA

POC: Taryn Crowder, (703) 247-2566

e-mail: tcrowder@ndia.org

Launch & Recovery of Manned & Unmanned Ve- hicles from Marine Platforms 2010 Symposium

8-9 Mar 2010

Linthicum, MD

POC: American Society of Naval Engineers

[http://www.navalengineers.org/Events/LR2010/](http://www.navalengineers.org/Events/LR2010/LAR2010.html)

LAR2010.html

2010 Joint Undersea Warfare Technology Spring Conference

8-11 Mar 2010

San Diego, CA

POC: Ms. Kimberly Williams, (703)247-2578

e-mail: kwilliams@ndia.org

Short Course on Live Fire Test and Evaluation, "Building Survivable Systems"

16-18 Mar 2010

Belcamp, MD

POC: The O'Bryon Group, (443) 528-2711

e-mail: jamesobryon@obryongroup.com

2010 DTIC Conference

22 - 24 Mar 2010

Alexandria, VA

POC: Defense Technical Information Center (DTIC)

(703) 767-8236, DSN: 427-8236

e-mail: confinfo@dtic.mil

8th Annual Missile Defense Conference and Exhibit

22 - 24 Mar 2010

Washington, DC

POC: AIAA, (800) 639-2422

e-mail: custserv@aiaa.org

19th Behavior Representation in Modeling & Simula- tion (BRIMS) Conference

22-25 Mar 2010

Charleston, SC

POC: BRIMS, (919) 326-0278

e-mail: info@brimsconference.org

<http://brimsconference.org/>

APRIL 2010

51st AIAA/ASME/ASCE/AHS/ASC Structures, Struc- tural Dynamics, and Materials Conference

12 - 15 Apr 2010

Orlando, Florida

POC: AIAA, (800) 639-2422

e-mail: custserv@aiaa.org

Directed Energy Systems Symposium

12 - 16 April 2010

Monterey, California

Mark Neice, (505) 284-8200,

e-mail: Mark.Neice@jto.hpc.mil

Don Streater, (757) 794-2829

e-mail: Donald.Streater@langley.af.mil

<http://www.deps.org/DEPSpages/DESystems-Symp10.html>

AAAA Annual Convention

14-17 Apr 2010

Fort Worth, TX

POC: AAAA, (203) 268-2450, www.quad-a.org

AIAA Infotech@Aerospace 2010

20 - 22 Apr 2010

Atlanta, Georgia

POC: AIAA, (800) 639-2422

e-mail: custserv@aiaa.org

SpaceOps 2010 Conference Delivering on the Dream

25-30 Apr 2010

Huntsville, Alabama

POC: AIAA, (800) 639-2422

e-mail: custserv@aiaa.org

2010 Threat Weapons & Effects (TWE) Training Seminar

27-29 Apr 2010

Fort Walton Beach, FL

POC: <http://www.bahdayton.com/jcat2010>

MAY 2010

2010 Aircraft Combat Survivability Short Course 4-7 May 2010

Monterey, California

SURVIAC, Paul Jeng, (937) 255-3828 x273

DSN: 785-3828 x273

E-mail: jeng_paul@bah.com

<http://www.bahdayton.com/jaspsc>

Global Explosive Ordnance Disposal Conference & Exhibition

27-30 April 2010

Fort Walton Beach, FL

POC: NDIA, Mary Anna Christiansen

(703) 247-2596, e-mail: mchristiansen@ndia.org

54th Annual Fuze Conference

11-13 May 2010

Kansas City, MO

NDIA, Mary Katherine Saladino, (703) 247-2540,

e-mail: msaladino@ndia.org

AHS International 66th Annual Forum & Technology Display

11-13 May 2010

Phoenix, AZ

POC: AHS, 703-684-6777, e-mail: Staff@vtol.org

<http://vtol.org/forum66/forum66.html>

JUNE 2010

Test Week 2010

14-17 Jun 2010

Huntsville, AL

Sherry Hilley, (256) 824-6715

sherry.hilley@us.army.mil

<http://www.testweek.org/>

JMUM 2010

15-17 Jun 2010

Colorado Springs, Colorado

SURVIAC, Paul Jeng, (937) 255-3828 x273

DSN: 785-3828 x273

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