Survivability/Vulnerability Information Analysis Center

SURVIAC Bulletin

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

Mild Traumatic Brain Injuries (mTBI)

by Dr. Victoria Tepe and Mr. Matt Kolleck, Booz Allen Hamilton

Each year, some 1.5 million or more Americans sustain non-fatal brain injury. Traumatic brain injuries (TBI) are defined as the result of external force, which may include the head being struck by or striking an object (blunt impact), foreign body penetration of the brain, brain acceleration/deceleration movement, or forces from an external event such as a blast or explosion. TBIs are classified as mild, moderate, or severe based on the severity of the underlying injury (vs. severity of symptoms). The large majority of TBIs (75-90%) are classified as mild.

TBI is one of the many known risks faced by military personnel in combat or in the course of specific high-risk military activities (e.g., parachuting). In addition to the impact of TBI on individual service members and their families, dramatic costs are incurred by the military itself. A Defense and Veterans Head Injury Program (DVHIP) study of military TBI found that in addition to a dramatically increased risk for medical discharge due to TBI, military personnel with mild TBI were also more likely to be discharged for behavioral causes, including alcoholism, drug use, and criminal conviction.

During the 1990s, a marked decrease was observed in TBI-related hospitalization of active duty U.S. Army personnel. By the late 1990s, Army TBI hospitalization rates were, in fact, lower than civilian rates. More recently, however, TBI has become known as the "signature injury" of armed conflicts in Iraq and Afghanistan. The Joint Theater Trauma Registry (U.S. Army Institute of Surgical Research) reported that 22% of soldiers wounded in Iraq and Afghanistan sustained injuries to the head, face, or neck.

Most TBIs sustained by U.S. troops during combat in Iraq and Afghanistan have been identified as closed-head injuries due to explosion/blast from improvised explosive devices (IEDs). Although the precise pathophysiological effects of blast injury to the brain are not yet fully understood, recent clinical and experimental findings have shown that blast injuries can and do cause brain damage associated with biochemical changes and cognitive impairment.

Media attention to the problem of TBI in professional sports has helped to improve public awareness. Although the potential long-term effects of TBI have sometimes been denied by professional sports associations, research now demonstrates that these risks are very real and potentially serious. A recent study entitled *Dementia Risk Seen in Players in N.F.L.* - performed for the NFL by the University of Michigan Institute for Social Research (ISR) in 2009, showed that participation in football increases the risk of dementia. Another study performed by the North Carolina Center for the Study of Retired Athletes (CSRA) in 2005 showed similar results. These and other studies have finally convinced NFL officials that the long term effects of concussions and other head injuries are potentially quite serious and warrant careful care and attention. In his annual State of the NFL news conference this year, NFL Commissioner Roger Goodell acknowledged that the NFL was changing its approach to concussions and other head injuries. The NFL has finally begun to accept the results of the numerous studies that likened the effects of head injuries with those of dementia and other forms of mental decline and cognitive disability. Accordingly, the league has enacted tougher guidelines for when a player can return to action after a concussion and increased public awareness and player education.

mTBI continued on page 3

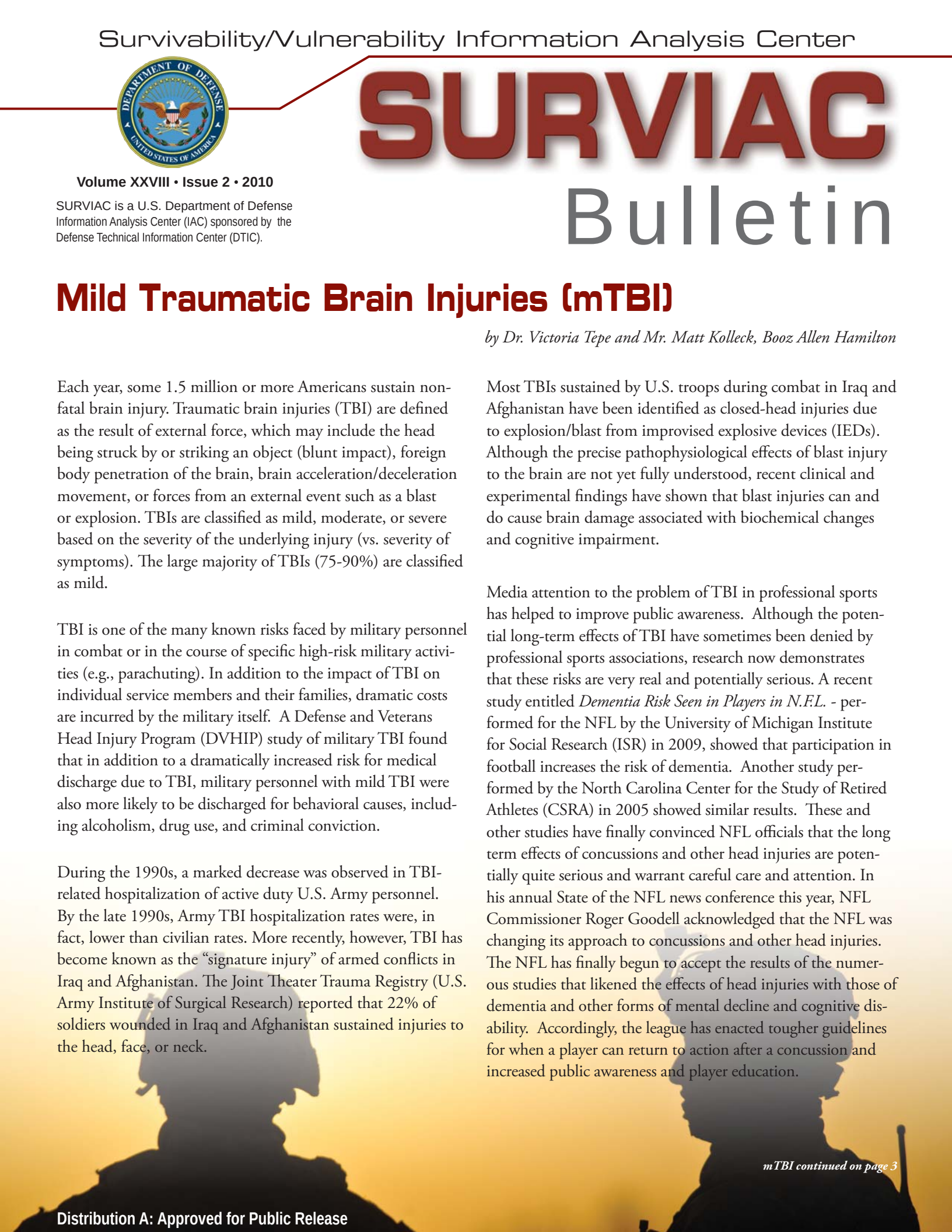

Table of Contents

SURVIAC Bulletin
Vol XXVIII • Issue 2

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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.

mTBI continued from page 1.

Diagnosing mTBI

Generally speaking, mTBI is evidenced by any decreased level of consciousness or alteration in mental state (slowed thinking, confusion) at the time of injury and/or subsequent neurologic deficits (loss of balance, weakness, sensory changes, aphasia, etc.) or psychiatric symptoms (depression, apathy, impulsiveness, etc.). Ideally, these criteria and symptoms should be confirmed by in-depth interview with a knowledgeable clinician.

Professional medical organizations such as the American Congress of Rehabilitation Medicine (ACRM), Centers for Disease Control and Injury Prevention (CDC), and the World Health Organization (WHO) Task Force on Mild Traumatic Brain Injury have identified various specific criteria by which to define and diagnose mTBI. Although generally consistent with respect to key symptoms (e.g., altered mental state), different organizations are more or less conservative with respect to symptom severity or duration requirements. Common across the various diagnostic criterion sets of the different health organizations is the recognition that mTBI often results in at least some temporary alteration of mental status, whether this takes the form of confusion, daze, disorientation, amnesia, or loss of consciousness. Under the criteria provided by the ACRM and the CDC, virtually any alteration of mental status by itself would be sufficient as evidence of possible mTBI. The criteria of the WHO are somewhat more demanding, recognizing the additional need to consider and exclude other possible causes.

A number of tools are currently being researched as possible diagnostic tools. Electroencephalographic (EEG) testing is a potentially informative area of study for the assessment of mTBI. Numerous studies have reported changes in EEG, quantitative EEG (qEEG), evoked potential (EP), and/or event-related potential (ERP) indices of brain activity, sensory, or information processing alterations in relationship to head trauma. In particular, it has been suggested that evoked potentials may be useful as predictors of TBI recovery or outcome.

Neuropsychological and behavioral tests can be useful to monitor mTBI recovery, and have been demonstrated as potentially informative to the assessment of sport-related and military mTBI. Accordingly, the U.S. military now administers the Automated Neuropsychological Assessment Metrics (ANAM) as a mandatory pre-deployment test by which to gather baseline neurocognitive performance data as basis for later comparison if necessary to document possible functional changes due to TBI. This provides an important and unique opportunity for individualized clinical assessment.

New and emerging neuroimaging technologies offer promise for improved understanding, accuracy, and precision in the assessment of mTBI. Mild TBI usually is not immediately associated with significant structural grey matter changes that can be seen on CT and MRI images. However, functional MRI (fMRI) has been used to identify activation pattern differences associated with memory complaints in mTBI patients whose memory task performance was otherwise apparently normal. Used in combination with structural MRI, proton magnetic resonance spectroscopy (SPECT) is an imaging method of measuring cellular-level (metabolic) activity in brain white matter. A number of studies suggest that SPECT may be useful to identify the cellular basis for long-term neurological disability in TBI patients, and that the cellular damage identified by SPECT may also correlate with injury severity and aid in predicting patient outcome.

Another type of MRI imaging technique known as diffusion tensor imaging (DTI) provides an opportunity to view white matter injury by analyzing the direction of water diffusion along the length of axons. DTI has been used to identify mTBI-related diffuse axonal injury in several recent studies. Magnetoencephalography (MEG) is an imaging technique that detects intracellular currents and resulting magnetic fields associated with synaptic potentials in the brain. A few studies suggest that MEG may offer even greater sensitivity than DTI to the effects of subtle neuronal injury associated with mTBI and may be especially informative in cases that involve specific cognitive (memory, attention, and executive function) or postconcussive symptoms.

Positron emission tomography (PET) is a nuclear medicine imaging technique that can also be used to produce a 3-dimensional image of brain functional processes. This technique requires injection of a radioactive tracer. PET may be useful to explore the basis for persistent post-concussive symptoms. The PET procedure has been used to document frontal and anteriotemporo-frontal neuropathology in mTBI patients who reported persistent deficits months or years after injury. Similarly, the PET maging technique was applied to identify temporal lobe metabolic abnormality in a child suffering long-term effects of mTBI. In each case, PET results corroborated neuropsychological findings of specific cognitive deficits.

Diagnosing Military mTBI

Prior to 2007, the U.S. DoD did not routinely screen for TBI as part of post-deployment health assessment. In 2006, a survey of emergency department and primary care clinic health care providers at the Wilford Hall Air Force Medical Center

mTBI continued on page 4

mTBI continued from page 3.

indicated that most providers screened for possible mTBI strictly on the basis of somatic symptoms (e.g., vision changes, nausea, headache), without specific attention to emotional, cognitive, or psychosocial factors.

In March of 2007, the Office of the Assistant Secretary of Defense for Health Affairs issued a memorandum concerning the definition and reporting of military TBI (Health Affairs Memorandum, 2007). The memo, which was directed to the Assistant Secretaries of the Army, Navy, and Air Force, identified TBI as a significant health concern for the DoD, and established a common definition of TBI to support consistent diagnosis and case reporting across the armed services. The DoD thus adopted the following as its definition of TBI:

> A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:
>
> - Any period of loss of or a decreased level of consciousness;
> - Any loss of memory for events immediately before or after the injury;
> - Any alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.);
> - Neurological deficits (weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia, etc.) that may or may not be transient;
> - Intracranial lesion.

Using these criteria, military medical providers were instructed to classify the severity of TBI as mild when structural imaging is normal, loss of consciousness is less than 30 minutes, alteration of consciousness is less than 24 hours, *or* post-traumatic amnesia is less than one day. If the patient meets criteria in more than one category of severity, a higher level of severity is assigned.

Conclusions

Clearly, medical and scientific interest in military mTBI has increased dramatically in recent years, due to the large numbers of service members who have been exposed to trauma-related injuries in Iraq and Afghanistan. Although studies involving military patient samples are still quite limited in number, there is an obvious trend toward more and better research in this area. Even within the limited existing literature, it is evident that researchers are now making use of screening criteria, instruments, and other resources developed and made available through the Defense and Veterans Brain Injury Center (DVBIC). Originally established in 1992 as the Defense and Veterans Head Injury Program (DVHIP), the DVBIC now plays a central role in performing and advancing research that will directly benefit military service members and veterans with TBI. DVBIC research efforts currently underway aim to increase medical and scientific knowledge of blast-related TBI, enhance the speed and accuracy of mTBI assessment, improve helmet design, provide better patient education and services, and identify medications that may be helpful in treating the various physical and psychological effects of TBI. The scientific and health care benefits of these efforts will certainly extend well beyond the military itself.

New and additional methods are needed to improve the accuracy and efficiency of mTBI diagnosis, and to inform prognosis, symptom treatment, and functional recovery. The identification of biomarkers for mTBI may eventually help to inform a more precise approach to assessment, diagnosis, prognosis, and monitoring. Researchers have identified a number of endocrine responses to neurotrauma, reporting alterations in thyroid-stimulating hormone (TSH), cortisol, total triiodothyronine (T3), and testosterone within 1-7 days after injury. The dynamics of these alterations suggest that they may be also sensitive to the severity of brain damage. Post-TBI changes in plasma magnesium and blood oxidants/antioxidants have also been reported, and the blood serum protein S100B (calcium binding protein) is well-known as a sensitive biochemical marker of brain injury. However, additional research is needed to explore the full diagnostic utility of these and other biochemical markers. For example, elevated S100B may also be associated with post-traumatic stress; serum levels after mTBI show only weak correlation with neuropsychological outcome. Thus, S100B may not be helpful as a means to differentiate between organic and psychologic etiology.

For more information, please contact Ms. Victoria Tepe
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About the Authors

Victoria Tepe, PhD

Dr. Tepe, an Associate with Booz Allen Hamilton, is a behavioral neuroscientist with more than 20 years of research and analysis experience in academic, medical, and military settings. She has provided expertise to the U.S. Air Force School of Aerospace Medicine, U.S. Air Force Research Laboratory, and U.S. Army Department of Military Medicine's Military Operational Medicine program. She is a published author in the behavioral sciences, including cognitive psychophysiology, human factors, stress and resilience, and human performance. Dr. Tepe's published works include three co-edited books in the field of military medical science. As a Technical Project Manager for the Human Systems Integration Information Analysis Center (HSIAC) and the Survivability and Vulnerability Information Analysis Center (SURVIAC), Dr. Tepe has managed numerous projects for U.S. Army Medical Research and Materiel Command (MOMRP and TATRC) contracts in the areas of military medicine. In earlier work with the U.S. Air Force School of Aerospace Medicine and the Air force Research Laboratory's Cognitive Engineering Lab, Dr. Tepe conducted and published research to identify brain electrophysiological and neuro-cognitive mapping effects of decision making, cognitive workload, and brain-actuated control.

Matt Kolleck

Mr Kolleck is an Associate with Booz Allen Hamilton Inc. He has 22 years of experience in the area of survivability/vulnerability with the Aeronautical Systems Center, Wright Patterson Air Force Base, OH, and Booz Allen Hamilton. He has extensive experience in the area of fire suppression technology, having supported the Joint DoD/FAA Halon Replacement Program for Aviation and the National Institute of Standards and Technology (NIST) Next Generation Fire Suppression Technology Program (NGP). He has also served as an Adjunct Instructor at the Air Force Institute of Technology where he taught the aircraft survivability course. Mr Kolleck earned his B.S. in Aerospace Engineering from the University of Cincinnati and his M.B.A. in Finance and M.S. in Economics from Wright State University. He may be reached at kolleck_matt@bah.com.

SURVIAC Liaison Workshop

The Survivability / Vulnerability Information Analysis Center (SURVIAC) invites you to join our annual SURVIAC Liaison Workshop at our facility at Wright-Patterson AFB, Ohio on 26-28 October 2010.

SURVIAC implemented this innovative liaison program to expand the survivability/vulnerability user base through the on site training of Government and Industry volunteers located remotely from the Wright Patterson AFB, Ohio office. The purpose of the Liaison training program is two-fold. The objective is to increase the knowledge about SURVIAC and what resources we have to support other agency's/company's mission. The second objective is to inform us about your respective needs so that we can better support you in the future. The workshop is open to government and industry personnel. Three days will be spent investigating databases and libraries, performing searches, reviewing products and models, reviewing Technical Area Tasks, becoming familiar with key survivability and lethality agencies, as well as simply becoming familiar with the day-to-day operation of the SURVIAC office. Discussions will be held relative to ongoing efforts in the survivability/lethality communities and a briefing will be presented by the Defense Technical Information Center (DTIC) Information Analysis Center (IAC) Program Office. Each participant will be informed on how the IACs and DTIC interrelate and how they are available to support the varied warfighter missions. The last day will be spent discussing the needs of each liaison and how a more effective relationship through this program might be established. In addition to the instruction, attendees will come away with the realization that a vast amount of information is available both at SURVIAC and throughout the community.

The cost of this workshop is $1000. Each liaison volunteer will come away with models & products of their choice. For more information on this year's workshop please contact Donna Egner, (937) 255-3828 x282, e-mail egner_donna@bah.com.

HLS Spotlight: Modular Emergency Medical System (MEMS)

By Jack Smith, Program Manager for Dynamic Medical Systems, National Center for Medical Readiness, Wright State University

In response to the ever-present and growing threat of biological and chemical terrorism within the United States, congress passed Public Law 104-201, Title XIV - The Defense Against Weapons of Mass Destruction Act of 1996 (also known as the Nunn-Lugar-Domenici Domestic Preparedness Act). Within this law, the Department of Defense was mandated to develop and implement a program to improve the response capabilities of federal, state, and local agencies to emergencies involving biological and chemical weapons. One product of this initiative was a concept paper published in June 2002 by a multi-agency task force led by the U.S. Army Soldier and Biological Chemical Command (SBCCOM) headquartered at the Aberdeen Proving Ground. This program, known as the Biological Warfare Improved Response Program (BWIRP), provides federal, state, and local agencies with a template for an integrated emergency response to a biological and chemical attack.

Most communities, regardless of population, are not equipped to handle the extensive number of casualties that may result from such an attack. In fact, most hospitals operate on a daily basis at 94% - 102% bed capacity. In recognition of the fact the hospital is a fixed capacity asset with a limited ability to expand in order to accept the surge of patients in a mass casualty incident the BWIRP task force developed the Modular Emergency Medical System (MEMS) concept. The MEMS model is based in theory on the rapid deployment of two types of expandable patient care modules, the Neighborhood Emergency Help Center (NEHC) and the Acute Care Center (ACC). The MEMS concept also includes a Medical Command and Control (MCC) element, Casualty Transportation System (CTS), Community Outreach, Mass Prophylaxis, and Public Information components.

In 2006, the Ohio Department of Health (ODH) contracted with the National Center for Medical Readiness (NCMR) at the Wright State University's Boonshoft School of Medicine to design and develop a MEMS asset for the State of Ohio. Because Ohio's larger urban areas of Cincinnati, Columbus, and Cleveland had received Urban Area Security Initiative (UASI) funding directly from the Department of Homeland Security, ODH sought to use the funding it received from the Department of Health and Human Services (DHHS) Assistant Secretary for Preparedness and Response (ASPR) provide a mass casualty care or "medical surge" capability for other regions of the state. The pilot project called for establishing one NEHC and a 1000-bed ACC for Homeland Security Region 3 (west central) including the eight county area around Dayton, Ohio. The second phase of the project in 2008 extended the program to Homeland Security Regions 1(northeast), 7, and 8(both southeast). Ohio's total MEMS model now includes one NEHC and seven 250-bed ACCs for a total of 1,750 ACC beds covering 44 of Ohio's 88 counties.

MEMS supplies are stored in a warehouse and can be loaded quickly into a semi for transport.

An example of how beds from the MEMS could be set up in the event of an emergency such as a pandemic influenza outbreak.

While the MEMS model was originally developed for an anticipated surge of casualties from a biological or chemical attack, Ohio's MEMS model has also been expanded to include treatment of patients in the event of other disasters, including a widespread pandemic influenza outbreak. Each module of the Ohio MEMS model is designed to be self-sufficient for 72 hours. The concept of operations for the MEMS model outlines the NEHC as a triage center or "Urgent Care" type facility that can see up to 1000 patients in a 24 hour period. It is expected that the majority of patients would respond to the NEHC rather than the local hospital. It is here that patients are triaged, treated, and then sent either to their home, the hospital, or the ACC. Each 250-bed ACC provides IV rehydration, pain management, antibiotics, and respiratory support.

As a deployment model, the Ohio MEMS model utilizes buildings of opportunity for deployment sites as opposed to utilizing tents for operation. This strategy provides two distinct advantages. First, by eliminating the extensive investment necessary to purchase adequate tentage, funding was reallocated toward more clinical treatment capability. Second, by eliminating the physical mass of tent systems necessary to shelter nearly 1800 beds, the logistical footprint is smaller and more agile. In fact, testing has proven that 12 people with no prior experience in Incident Command, Health Care, or disaster response can unpack and set up a 250-bed ACC in 3 ½ hours.

In the event of an overwhelming patient surge, the MEMS assets are available for local communities upon request through the local Emergency Management Agency.

About the Author

Jack Smith

Mr. Jack Smith is the Program Manager for Dynamic Medical Systems with the National Center for Medical Readiness at Wright State University where he helped to design and develop the Ohio MEMS model. He is a 27-year veteran of the fire service. Jack holds a Bachelors' in Business Administration and is currently finishing his Master's in Emergency Management.

Continuity of Operations (COOP) Planning State-of-the-Art-Report

Today we are experiencing a wide range of sweeping changes in our nation's continuity policies. This State-of-the-Art Report (SOAR) is designed to help organizations in the homeland security community, particularly the Department of Defense (DoD), understand the dynamic nature of these ongoing policy changes, and how the changes will affect existing continuity plans and procedures.

This SOAR provides perspective and insight on emerging federal executive branch continuity policy. The SOAR neither supplements nor reiterates policy—rather, it provides a broad academic overview of the fundamentals of continuity and the forces influencing their application.

This unclassified report is available through SURVIAC for Government and Contractors with current Need-to-Know. For more information please contact Mr. A.J. Brown at SURVIAC, (937) 255-3828 x284, or by e-mail: alvin.brown@wpafb.af.mil

SURVIAC
25 Years of Survivability Excellence

By Kevin Crosthwaite, SURVIAC Director

On 20 December 1984, the United States conducted a nuclear test in Nevada. Another event far less destructive or seismic also occurred across the country. The Survivability/Vulnerability Information Analysis Center (SURVIAC) was created that same day, at Wright-Patterson AFB, Ohio, without the big bang. It was actually announced with just a small contract award to Booz Allen Hamilton to operate a new institution to replace the Combat Damage Incident Center (CDIC) and the Aircraft Survivability Model Repository (ASMR.)

SURVIAC was created through the active encouragement of the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS), now known as the Joint Aircraft Survivability Program (JASP), led by Dale Atkinson, and the Joint Technical Coordinating Group for Munitions Effectiveness, led by John Blomquist. The first director was Aulay Carlson, the first Contracting Officer's Technical Representative (COTR) was Gary Streets, and the DTIC IAC PM was Jim Pendergast. SURVIAC has always been located at Wright-Patterson AFB, but we have resided in three different buildings (4F, 45, and 1661) and had eight different office symbols (AFWAL, ARDC, WL, AFRL, VAVS & VACS, 46 OG, 780 TS and currently 46 TG)

Numerous leaders have made key contributions to the development of SURVIAC. John Vice, Matt Kolleck and Kevin Crosthwaite have subsequently served as directors. Curt Fett, John Sparks, Jim Folck, Ray Flores, Ralph Lauzze, Marty Lentz, and Peggy Wagner have been COTR or CORs. The DTIC IAC program has been led by Paul Klinefelter, Forrest Frank, Ron Hale and Terry Heston. Each of these people and dozens of other employees have left their mark on building the SURVIAC institution. One constant throughout this time is Donna Egner who has been with SURVIAC since its inception, and currently serves as the Deputy Director.

For those history buffs, here are a few other 1984 highlights:

In politics;

- The Iraqi-Iranian war was raging
- Ronald Reagan was President
- Pierre Trudeau was voted out in Canada
- Konstantin Chernenko led the USSR
- Indira Gandhi was assassinated in India

Donna Egner has been with SURVIAC since its inception and is currently the Deputy Director.

In business;

- Apple introduced the MacIntosh (after the famous 1984 Super Bowl commercial)
- AT&T was split up
- Wendy's came out with "Where's the beef?"

In sports;

- In sports the NCAA tournament expanded to 64 teams and Georgetown won
- Oakland Raiders won the Super Bowl
- The Celtics beat the Lakers
- John McEnroe beat Jimmy Connors
- Miami won the NCAA football Championship
- Pete Rose got his 4,000 hit

On the social scene;

- *Thriller* was replaced by *Footloose* as top album
- Cyndi Lauper released *Time after Time*
- Madonna recorded *Like a Virgin*
- Vanessa Williams resigned as Miss America;
- and in this George Orwellian year AIDS was first identified.

If you are like me (old ☺), some of these events seem ages ago, however, some seem like yesterday. The SURVIAC Institution has certainly come a long way. When we started, SURVIAC had five models, about 3,000 documents, no tasks, just a handful of employees, and no customers. We considered ourselves high tech when we received our first fax and that 2400 baud modem was an amazing advance. We had portable COMPAQ computers about the size and weight of a suitcase. Cell phones, if you had them, were the size of bricks. The dupe key on the keypunch machine was a lifesaver as well as the error correction tape for the typewriter.

Over the years that has all changed. We have over 30,000 documents and 15 models, for which we are known for our model service support. SURVIAC currently has 170 open active tasks, which involve over two thousand employees and subcontractors. We have a SIPRNET with direct connection to the warfighters and relevant databases to support their requirements. We answer thousands of inquiries that come in by telephone, email, or through our website http://iac.dtic.mil/surviac.

It is truly the SURVIAC customers that have sparked and supported the growth of this institution. They have continued to come back to us as we grew through our faltering first steps. They have been patient with us as we struggled to meet their requirements. They have spread the word about SURVIAC. Our customers have been willing to share the details of their problems. They have been generous with their advice and encouragement. We have simply tried to respond and reflect their needs. Truly, the institution of SURVIAC has been built by the customers who are willing to turn to us and partner with us. We thank you for a fine 25 years and look forward to continuing to meet your evolving needs.

IAC Spotlight - CPIAC

The Chemical Propulsion Information Analysis Center (CPIAC) is the U.S. national clearinghouse and technical resource center for data, reports, and analyses related to system and component level technologies for chemical, electrical, and nuclear propulsion for rockets, missiles, and space and gun propulsion systems. CPIAC is a U.S. Department of Defense Information Analysis Center (IAC) operated by The Johns Hopkins University (JHU), Whiting School of Engineering. Located in Columbia, Maryland — midway between Baltimore and Washington, D.C. — CPIAC and its predecessor organizations have been continuously operated by JHU since 1946. Over the years, CPIAC's scope has expanded in response to technological advances, changing critical needs, and global interests.

In addition to maintaining the most comprehensive propulsion-related scientific and technical reports collection in the world, CPIAC maintains a number of industry handbooks, manuals, databases, and its signature Propulsion Information Retrieval System (PIRS). This extensive information collection represents the documented national knowledge base in chemical rocket propulsion and is available for dissemination to eligible individuals and organizations. Most recent additions to the CPIAC collection include Hazards of Chemical Rockets and Propellants (Pub. 394), Update on Novel Energetic Materials (SP 09-01), Propellant and Explosive Ingredients Database, Spacecraft Chemical Propulsion Database, and Predicting Full Scale Test Results for Insensitive Munitions: A State of the Art Assessment (CPTR 81).

As a knowledgeable and objective participant in supporting industry research and development, CPIAC assists sponsors in maximizing increasingly limited research and development funding by focusing on key propulsion system technology needs through workshops, symposia, technical assessments, and surveys. CPIAC also performs research in support of its publication of recurrent technology reviews and state of the art reports in selected technical areas.

In addition, CPIAC provides critical technical and administrative support to the Joint Army-Navy-NASA-Air Force (JANNAF) Interagency Propulsion Committee, the primary technical information exchange platform for the U.S. propulsion industry. JANNAF is organized into eleven functional subcommittees that are aligned with key propulsion technology areas, and CPIAC administers two technical meetings per year for JANNAF. Meetings range in size from approximately 300 attendees to more than 700. CPIAC publishes JANNAF workshop and meeting proceedings as well as a peer-reviewed, limited-distribution technical journal, the JANNAF Journal of Propulsion and Energetics.

Policy oversight of CPIAC and the IAC program is provided by the Office of the Secretary of Defense, Director of Defense Research and Engineering (DDR&E). Government administrative management of CPIAC is provided by the Defense Technical Information Center (DTIC) IAC Program Management Office (PMO). Technical management of CPIAC is provided by an appointed Contracting Officer's Representative (COR) from a sponsoring DoD organization. CPIAC's current COR is with the U.S. Army Research Laboratory (ARL), Aberdeen Proving Ground, Maryland.

Subscription and Product Information

CPIAC offers subscription services at unclassified and classified levels. Subscribers to the CPIAC Information Services are required to maintain active registration with the Defense Logistics Information Service (DLIS) to receive export-controlled, militarily critical technical information, and must also be registered with the Defense Technical Information Center (DTIC); classified-level subscribers must maintain an appropriately classified contract in the propulsion technology area. For further information about CPIAC products and services, please contact CPIAC Customer Service at (410) 992-7300.

For additional information about CPIAC, visit us on the Web at www.cpiac.jhu.edu. For more information about JANNAF, go to www.jannaf.org.

Serving the Greater Propulsion Community for Over 60 Years

ALARM 5.4 and EARCE 3.4 Released

SURVIAC has begun distributing the newest Advanced Low Altitude Radar Model (ALARM) version 5.4, ESAMS, ALARM, and RADGUNS (EAR) Common RF Environment (CE) (EARCE) 3.4 and documentation.

Several updates have been made since the last version. The following is a recap of the new or updated features.

ALARM 5.4

The new version of Advanced Low Altitude Radar Model (ALARM) is an upgrade from ALARM 5.2. ALARM is a generic digital computer simulation designed to evaluate the performance of a ground based radar system attempting to detect low altitude aircraft. The purpose of ALARM is to provide a radar analyst with a software simulation tool to evaluate the detection performance of a ground-based radar system against the target of interest in a realistic environment. ALARM can simulate pulsed/Moving Target Indicator (MTI), and pulse Doppler (PD) type radar systems and has a limited capability to model continuous wave (CW) radar. Radar detection calculations are based on the signal-to-noise (S/N) radar range equations commonly used in radar analysis. ALARM has four simulation modes: Flight Path Analysis (FPA) mode, Horizontal Detection Contour (HDC) mode, Vertical Coverage Envelope (VCE) mode, and Vertical Detection Contour (VDC) mode.

This version of ALARM is an enhancement release with several changes.

What's New in ALARM 5.4?

Here is a list of the new ALARM inputs: VPDRCS_FILE, CLUT_ZONE_TABLE.

Other changes include:

- Added a new RCS file type named VPDRCS. This file type contains a processed RCS value that is dependent on target velocity and radar probability of detection. (SPCR #1387)

- Added support for FPA flight paths that are relative to the radar. (SPCR #1146)

- Fixed an access violation that occurred on Windows machines for a particular configuration of an input file. (SPCR #1389)

- Fixed an array bound violation that could occur when using the _TABLE type inputs. (SPCR #1392)

- Added a new support utility named RCSAntChart. This utility is for plotting antenna files and RCS files. (SPCR #1390)

- Fixed incorrect check of GPVAL_TERM in template files. (SPCR #1394)

- Fixed a problem with the create_a_contour script that caused it to fail for plot types "conlos" and "intlos." Also add a new option of "-S factor" to for the S/I scale factor when applicable. (SPCR #1395)

- Fixed a divide by zero error that occurred when the target was below the terrain. (SPCR #1396)

- Fixed a issue where the last point of a 2D pattern was not being used. This problem was only a issue when an antenna pattern had a very small number of points. (SPCR #1376)

- Workaround for Sun Studio 9 failing to compile hdc_diary_class with optimization. (SPCR #1397)

- Fixed possible use of unallocated jam_list in detection_manager.f90. (SPCR #1399)

- Fixed an issue with the VCE controller when running multiple files. (SPCR #1401)

EARCE 3.4

The new version of ESAMS, ALARM, and RADGUNS (EAR) Common RF Environment (CE) (EARCE) Modeling Component is an upgrade from EARCE 3.2. The ESAMS, ALARM and RADGUNS (EAR) models have comprised the core set of models for the Joint Aircraft Survivability Program (JASP). The JASP methodology subgroup mission is to establish an accepted joint service methodology for conducting air weapon survivability analysis using a flexible and efficient computational environment based on a credible set of components. Unfortunately, current survivability codes contain many duplicative algorithms. The model developers and JASP expend significant resources to develop and validate duplicative algorithms. In an effort to eliminate these duplicative algorithms, lower operating and validation costs, as well as provide more consistent results, the JASP sponsored an effort to develop a Common RF Modeling Components for the EAR models as part of a Common Model Component Set (CMCS) of which the environment (CE) is a subset.

What's New in EARCE 3.4?

- Fixed the computation that bounded relative clutter angles to +/- p . (SPCR #1398)

- Added the ability specify zones with differing clutter parameters. (SPCR #1391)

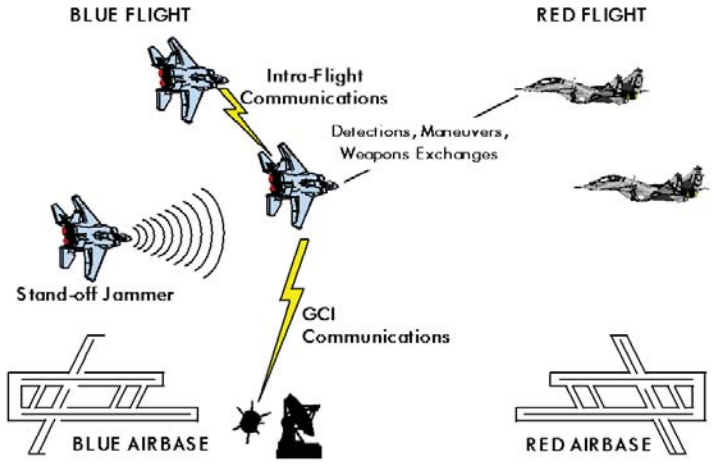
SURVIAC can be reached at (937) 255-3828, DSN 785-3828. Order requests should be directed to Mr. AJ Brown at 937-255-3828 x284 (DSN: 785-3828 x284) while technical questions should be directed to Mr. Barry Vincent at (937) 781-2456.

Brawler 7.2 released

SURVIAC has begun distributing the newest versions of BRAWLER v7.2. These programs and their upgrades are funded by HQ USAF/A9 with administrative support provided by the Joint Aircraft Survivability Program Office (JASPO).

The new version of BRAWLER v7.2 model is an update from BRAWLER v7.1. This upgrade includes:

- Surface-to-Air Simulation Engagement Zone Generator
- Maneuver for Third-Party Targeting Illuminator/Guider Prior to Launch
- Fixed and Upgraded to Terrain Usage in Brawler
- Visualization/Graphics Upgrades associated with the JASPO DRFM Project. Includes upgraded displays and prints to grmain and asimain (SIMDIS)
- Improvements to Smart Jammer Modeling
- Fixes to Allow Compilation of Brawler with gfortran Compliers
- Integration of New ARGO Models
- Integration of Code from Lockheed-Martin, Including Capture and Reduction-in-Lethality



BRAWLER simulates air-to-air combat between multiple flights of aircraft in both the visual and beyond-visual-range (BVR) arenas. This simulation of flight-versus-flight air combat is considered to render realistic behaviors of military fighter pilots. BRAWLER incorporates value-driven and information oriented principles in its structure to provide a Monte Carlo, event-driven simulation of air combat between multiple flights of aircraft with real-world stochastic features. The user decides the pilot's decision process including:

- Missions and tactical doctrines
- Aggressiveness
- Perceived capability of the enemy
- Reaction time
- Quality of the decisions made

Supported Platforms:

1) Linux
2) SGI
3) SUN

You can obtain the new version of BRAWLER v7.2 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) while technical questions should be directed to Mr. Barry Vincent at (937) 781-2456.

Winter JMUM 2010
16-18 November 2010 · Nellis AFB, NV

The Winter JASP Model Users Meeting (JMUM) will be held 16-18 November 2010 at Nellis AFB, Nevada. This meeting, sponsored by the Joint Aircraft Survivability Program (JASP) and executed by SURVIAC, is for those who are interested in the JASP suite of models which includes Enhanced Surface-to-Air Missile Simulation (ESAMS), Fast Shotline Generator (FASTGEN), Computation of Vulnerable Area Tool (COVART), Tactical Air Combat Simulation (BRAWLER), as well as many other models. In addition, the Joint Antiair Model (JAAM) and the Joint-Antiair Combat Effectiveness System (J-ACE) Configuration Control Board (CCB) meetings will run concurrently with JMUM. Furthermore, there will be availability to participate in two JAAM training sessions, however, seating is limited for these training sessions. The Joint Antiair Model (JAAM) and the Joint-Antiair Combat Effectiveness System (J-ACE) are sponsored and funded by the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME). The agenda for JMUM includes a half day of plenary session, a half day of demo/training session, followed by two days of breakout sessions. The J-ACE CCB meeting will be a full day, followed by half day of JAAM CCB. JMUM is an excellent networking event for the JASP and SURVIAC models users. The meeting promotes open discussion of hardware and software issues related to each of the JMUM models as well as other DOD survivability/vulnerability models. tact Paul Jeng, SURVIAC, (937) 255-3828 x273 or e-mail jeng_paul@bah.com.

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 3.4)	5.4
BLUEMAX 5	Variable Airspeed Flight Path Generator	1.0.2
BRAWLER	Air-to-Air Combat Simulation	7.2
*BRL-CAD	Ballistic Research Laboratory Computer-Aided Design Package	7.14.8
**COVART	Computation of Vulnerable Area Tool	6.1.1
ESAMS	Enhanced Surface-to-Air Missile Simulation	4.1
**FASTGEN	Fast Shotline Generator	6.1
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/survivabilityeducation.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.

A glimpse at the past...

An exerpt from the SURVIAC Bulletin Issue 2 May 1985

TELECOPIER NOW AVALABLE AT SURVIAC

If you have an urgent request which cannot be adequately described over the phone (and the restriction is not for security reasons), you may wish to take advantage of our telecopier to exchange your request or information with us. We have a Panafax PX-100 available to you at any time of day. It will automatically receive your document. Let your machine talk to our machine. Please do not send classified information over the telecopier; it is for unclassified information only."

Products Distributed by SURVIAC

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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 Occupant Casualty Assessment State-of-the-Art Report (SOAR)	$ 50.00
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

For further information on how to obtain these products 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.

Calendar of Events

OCTOBER 2010

20th International Aircraft Fire Protection/Mishap Investigation Course
4-8 Oct 2010
Dayton, OH
AFP Associates, Bob Clodfelter, (937) 434-8030
e-mail: afp1fire@afp1fire.com
www.afp1fire.com

DTIC/DLA/DTRA Products & Services Expo
5 Oct 2010
Fort Belvoir, VA
Bob Jeffers, (800) 878-2940 x226
e-mail: bj@fbcinc.com
http://www.fbcinc.com

Disruptive Technologies Conference: "Creating Capability Surprise for Irregular Warfare"
13-14 Oct 2010
Washington, DC
NDIA, Allison Doherty, (703) 247-2570
e-mail: adoherty@ndia.org
http://www.ndia.org/meetings/1920/Pages/default.aspx

Building Survivable Systems and Lethal Weapons: A Short Course in Live Fire Testing
19-21 Oct 2010
Belcamp, MD
The O'Bryon Group, Jim O'Bryon, (443) 528-2711
e-mail: jamesobryon@obryongroup.com

HELMOT IV, "Vertical Lift Technology: Lessons from Today – Planning for Tomorrow"
19-21 October 2010
Williamsburg, Virginia.
http://www.ahs-hrc.org/

48th Annual Targets, UAVs & Range Operations Symposium & Exhibition
19-21 Oct 2010
New Orleans, LA
NDIA, Meredith Geary, (703) 247-9476
e-mail: mgeary@ndia.org
http://www.ndia.org/meetings/1410/Pages/default.aspx

2010 TACOM LCMC APBI : Acquisition, Logistics and Technology Working Together for Warfighter Success
20-22 Oct 2010
Dearborn, MI
NDIA, Holley Slabaugh, (703) 247-2561
e-mail: hslabaugh@ndia.org
http://www.ndia.org/meetings/1520/Pages/default.aspx

SURVIAC Liaison Workshop
26-28 Oct 2010
Wright-Patterson ABF, OH
SURVIAC, Donna Egner, 937-255-3828 x282
e-mail: egner_donna@bah.com
http://www.bahdayton.com/surviac/Liaison.aspx

The Sixth Triennial International Fire & Cabin Safety Research Conference
25-28 Oct 2010
Atlantic City, NJ
FAA, April Horner, (609) 485-4471
e-mail: April.CTR.Horner@faa.gov
www.fire.tc.faa.gov/2010Conference/conference.asp

MILCOM 2010: "The Next Decade of Military Communications"
31 Oct - 3 Nov 2010
San Jose, CA
Jeannie Bell, 703.631.6200 x 3930
e-mail: jeannie.bell@jspargo.com
www.milcom.org

NOVEMBER 2010

2010 US Coast Guard Innovation Expo
2-4 Nov 2010
Tampa, FL
NDIA, Luellen Hoffman, (703) 247-9460
e-mail: lhoffman@ndia.org
http://www.ndia.org

Aircraft Survivability Symposium 2010
"Today's Successes, Tomorrow's Challenges"
2-5 Nov 2010
Monterey, CA
NDIA, Meredith Geary, (703) 247-9476
e-mail: mgeary@ndia.org
www.ndia.org/meetings/1940/Pages/default.aspx

2010 Combat Vehicles Conference
8-9 Nov 2010
Dearborn, MI
NDIA, Alexis Larkin, (703) 247-9463
e-mail: alarkin@ndia.org
http://www.ndia.org/meetings/1620/Pages/default.aspx

IEEE Conference on Technologies for Homeland Security
8-10 Nov 2010
Waltham, MA
IEEE, e-mail: registration@ieee-hst.org
http://ieee-hst.org/default.html

Thirteenth Annual Directed Energy Symposium
15-19 Nov 2010
Bethesda, MD
DEPS, Donna Storment, (505) 998-4910
e-mail: Donna@deps.org
http://www.deps.org/DEPSpages/DEsymp10.html

Winter JMUM
16 - 18 Nov 2010
Nellis AFB, NV
SURVIAC, Paul Jeng, (937) 255-3828 x273
e-mail: surviacmodels@bah.com

AIAA Missile Sciences Conference
16 - 18 Nov 2010
Monterey, California
AIAA, (800) 639-2422
e-mail: custserv@aiaa.org
www.aiaa.org

27th Army Science Conference (ASC)
29 Nov - 2 Dec 2010
Orlando, FL
Jayne Ashe, (757) 357-4011
e-mail: armyscienceconference@charterinternet.com
www.armyscienceconference.com

DECEMBER 2010

Launch & Recovery Symposium 2010
"Launch, Recovery & Operations of Manned and Unmanned Vehicles from Marine Platforms"
8-9 Dec 2010
Arlington, VA
ASNE, (703) 836-6727
e-mail: asnehq@navalengineers.org

AAAA Unmanned Aircraft Systems Symposium (UAS)
13-15 Dec 2010
Arlington, VA
AAAA, (203) 268-2450
www.quad-a.org

February 2010

2011 Tactical Wheeled Vehicles Conference
6-8 Feb 2011
Monterey, CA
NDIA, Angie R. DeKleine, (703) 247-2599
e-mail: adekleine@ndia.org

Visit our website for more event listings and information: http://iac.dtic.mil/surviac

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