ACTIONABLE SITUATIONAL AWARENESS PULL (ASAP)

by Ronald Koontz, Lockheed Martin

Among the Advanced Concept Technology Demonstrations (ACTD), approved by the Department of Defense (DoD) for 2005, the Actionable Situational Awareness Pull (ASAP) sets a new precedent for cooperation between government and industry. Under the auspices of the National Defense Industrial Association (NDIA), the ASAP ACTD has brought together, a dozen companies, and government representation from the US Pacific Command (US PACOM), the Defense Information Systems Agency (DISA), the Office of the Secretary of Defense (OSD), and the United States Air Force.

The ASAP ACTD addresses the critical Joint Warfighting Problem (JWP) of satisfying the need to "pull" and tailor relevant actionable information at the right time regardless of its location or the availability of bandwidth. The necessity for such an ACTD has resulted in a methodical approach by members of industry to support the specific needs of the war-fighter. This process began in June 2003 at a bi-monthly meeting of the NDIA's Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Division.

This article will look at (1) the formulation of a team to identify and select a C4ISR-related JWP, (2) the JWP this team has chosen, (3) the advanced concept solution; i.e., the technical approach and procedures for the JWP, and (4) the organizations participating in this effort.
Ladies and Gentlemen:

We have an exceptional article this time on an advanced concept technology demonstration (ACTD) in the area of actionable situational awareness. Ms. Sue Payton, Deputy Under Secretary of Defense for Advanced Systems and Concepts, recently approved this ACTD to aid the warfighter’s effectiveness. This is an effort to allow those commanders in the battle space to "pull" the relevant actionable information they need and tailor it regardless of its location or the bandwidth available. This idea was nurtured and brought to fruition by the Command Control Communications, Computers, Intelligence, Surveillance, and Reconnaissance Division of the National Defense Industrial Association, which included government and industry. We hope you find the article useful in contributing to your efforts supporting the warfighter.

Thanks,

Gary
1. Formulation of the Team

The C4ISR division of NDIA serves as a focal point for the identification, study, and resolution of technical, management, and business-related issues associated with the strategic and tactical C4ISR problems of government and the military. The principal objective of the C4ISR division has been to work with each military Service, the Joint Staff, the DoD, Defense agencies, combatant commanders (COCOMs), and other appropriate government agencies to provide industry with an understanding of C4ISR solutions. The C4ISR division has representation from a wide variety of industry members, from small businesses to Fortune 100 companies. The division's government advisor is from the Office of the Assistant Secretary of Defense for Networks and Information Integration, [OASD (NII)]

The mission of the C4ISR division is to provide continuous contributions to national security by commissioning studies by industry experts that address areas of need identified by the DoD. The division sponsors national symposia, seminars, and workshops on C4ISR and related topics. It also provides forums for the exchange of information via regular meetings with DoD civilians and military leaders.

2. Identification of the Joint Warfighting Problem

Under the leadership of the chairman of the DoD and Defense Agencies sub-committee, the C4ISR division conducted a review of lessons learned from both Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). The sub-committee communicated its intent to identify JWPs to staff members of various Combatant Commands. Thirty-two JWPs were identified as potential candidates for maturing technologies and/or Tactics, Techniques, and Procedures (TTPs). Three of these candidates were considered to be within the C4ISR domain. The three candidate JWPs reviewed at the November 3, 2003, meeting held at NDIA headquarters were (1) the need for a common antenna which could be mounted on ships or ground vehicles and be used across multiple frequency ranges, (2) the need for a communications management paradigm for mobile ad hoc networks, and (3) the need to give Tactical Commanders in a Joint Coalition Force the ability to "pull" and tailor relevant actionable information at the right time, regardless of the availability of bandwidth, their location or the location of the information.

After deliberation, the sub-committee agreed that the third of these candidate JWPs was the most appropriate. The objective was formally articulated as "the integration of maturing technologies to compose and demonstrate a software tool for user-centric "pull" in the Net-Centric Enterprise Services (NCES) architecture supporting the warfighter." NDIA invited the participating companies and some 550 individual members to a workshop to review a "use case" associated with Net-Centric Operations. Discussions incorporated findings developed at a NCES workshop sponsored by the Association for Enterprise Integration (AFEI), an affiliate of NDIA. A working group composed of the subcommittee chairman and personnel from OASD/NII, DISA, and the Titan Corporation, developed an approach to draw on data from (1) the Integrated Broadcast Service (IBS), (2) the Theater Interface Node (TIN) in PACOM (via a web service leveraging the DISA Net-Centric Capabilities Pilot (NCCP) program), and (3) the DISA User Defined Operational Picture (UDOP) to compose a "use case." This "use case" proposal was then presented at a workshop held at NDIA headquarters in Arlington, VA, November 23-24, 2003.

Following the workshop, twelve companies made a commitment to work as a multi-industry team to develop and execute an interdependent effort across multi-Service programs. The participants submitted a proposal to the Deputy Under Secretary of Defense (Advanced Systems and Concepts) in mid-December 2003. The proposal described a process to demonstrate Net-Centric Connectivity with Intelligence Data Services on the Global Information Grid in response to a requirements statement issued by the Deputy Secretary of Defense: "Provide Users with Improved Capability to Pull Whatever Data They Need, Whenever They Need It."
Need It, From Wherever They Are", dated 10 November 2003, DepSecDef GIG ES Memo, Paul Wolfowitz.

3. Identification of the Advanced Concept Solution

The proposed solution has six general requirements.

1. Provide global access to data that are theater-limited and/or stove-piped.
2. Provide access to information management servers, (i.e., IBS GIN/TIN, etc.), that enable users to search selected and tailored data repositories in a controlled fashion.
3. Provide selective query and "pull" of warfighter data when and where needed.
4. Support the information needs of U.S. and coalition tactical commanders, from national, theater, and tactical sources.
5. Provide seamless integration among existing joint and individual Services application programs.
6. Provide access to data fusion services, including access to classified networks.

The proposed solution does not require the development of new fusion capabilities. It does not obviate or replace existing national data repositories or require or produce new C2 applications to display or process information. It does not require a complete footprint of existing C2 or intelligence systems. It does not produce proprietary software or use software/hardware that has not been, or could not be, accredited for processing intelligence data.

The proposed solution utilizes a "spiral" approach to foster faster field-able services. It consists of multiple builds of complete functionality, iterated for successively increased levels of service, and augments the on-going NCES and Joint Command and Control (JC2) Service-Oriented Architecture (SOA) efforts. It will provide a measurement of technical demonstrations and architectural compatibility with NCES, and will ultimately "spiral" into the NCCP demonstrations. The proposed solution uses the Air Defense Advanced Technology Point-to-Point Protocol (ADAT PPP) and the Command and Control Information Exchange Data Model (C2IEDM) to insure coalition interoperability. It will measure the compatibility of the software and the tactics, techniques, and
procedures (TTPs) with deployed systems during operational demonstrations and live exercises. Finally, once deployed, it will provide an assessment of coalition/joint military utility and End-User Evaluation (EUE). This will demonstrate (1) the perceived value to the warfighter as he uses the capabilities in the field, (2) the robustness and scalability in a "live" loading environment, (3) the ease of deployment, to include training requirements, the ability to upgrade hardware and/or software, and the resolution of problems in the field, and (4) the impact of a warfighter's ability to "pull" and tailor information in the course of his daily activities.

The proposed solution promotes the use of a database standard referred to as the Command and Control Information Exchange Data Model (C2IEDM), a standard agreed upon by over 27 friendly countries to facilitate information exchange. Such a solution would leverage industry commercial-off-the-shelf (COTS) products that currently satisfy this standard during the initial stages, while supporting the migration to this standard for other C4ISR applications that are being developed by several team members.

(4) Identification of the Participating Organizations

ACTD Management Participants:

- DoD Oversight Executive - DUSD(AS&C), OSD
- Industry Oversight Executive - Lockheed-Martin
- Operational Manager - US PACOM
- Technical Manager - DISA
- Deputy Technical Manager - Titan Corp. / Industry Team
- Transition Manager - DISA

Government Participants:

- PACOM, DISA, US Air Force, OSD
- Other armed Services participating in various demonstrations and/or exercises

Industry Participants:

Prime:

- Titan Corp. - proposed the ASAP "Use Case" selected by the NDIA sub-committee
Other Industry Participants:

- AmberPoint
- BAE Systems North America
- Boeing
- CTC (Concurrent Technologies Corporation)
- Gestalt
- Google
- Lockheed-Martin
- Northrop-Grumman
- Oracle
- OSEC (Ocean System Engineering Corporation)
- SSE (Systematic Software Engineering)
- SYS (Polexis)
- Systinet
- WebLayers

Summary

The ASAP ACTD addresses a high priority coalition/joint warfighting capability. The government/industry team, in conjunction with the Operational Manager at US PACOM, has defined a concept for operations involving the information "pull" capability demonstrating its benefits across multiple missions and services.

The ASAP ACTD supports the evolving common operational picture as it transitions from the Common Operating Environment (COE) to the Net-Centric Operations envisioned for a JC2 capability. The transition strategy includes extension to all COCOMs in support of each service as a non-proprietary, re-usable NCES service development. ASAP ACTD is funded by DISA, DUSD (AS&C), the US Air Force Electronic Systems Center (ESC), and the industry team members. DISA provides a Technical Manager and a Transition Manager. Government oversight is provided under the leadership of Ms Sue Payton, DUSD (AS&C).

About the Author:

Ronald Koontz is responsible for pursuing new business at Lockheed-Martin Advanced Naval Systems with an emphasis in Network Centric Operations, and he assumed this position in April 2000.

Prior to joining industry, he served for 30 years in the U.S. Naval Submarine Service. His at sea assignments included 16 years on board submarines including a tour as Commanding Officer. His shore duties included the US Naval Postgraduate School, two tours on Commander Submarine Force Pacific Fleet staff, the latter as Chief of Staff for Communications, a tour in submarine communications requirements on the OPNAV staff, now Code N77, and three major acquisition program manager tours as Program Manager Submarine Communications PMW 173 at SPAWAR and as Program manager of both the AN/BSY-1 and AN/BSY-2 Submarine Combat Systems PMS 417 and PMS 418 at NAVSEA.

In 2004, Ron Koontz led the NDIA C4ISR Subcommittee’s efforts to become the first industrial sponsor of a DoD Advanced Concept Technology Demonstration (ACTD). The Actionable Situational Awareness Pull (ASAP) ACTD is a revolutionary approach to get combat-essential information into the tactical warfighters’ hands when they want it, where they want it, and no more than they need.

Ronald Koontz received the Fubini Award for 2004 as the C4ISR Person of the Year.
DARPA DEMONSTRATES NETWORK CENTRIC TECHNOLOGIES

DARPA announced the successful conclusion of a demonstration of advanced network centric technologies. The demonstration was held as part of a joint military exercise at White Sands Missile Range, N.M.

The autonomous control software technology highlighted in the demonstration was developed under DARPA’s Program Composition of Embedded Systems (PCES) program.

During the live-fire exercise, two airborne unmanned aerial vehicles (UAVs) carrying embedded autonomous control software performed intelligence, surveillance and reconnaissance (ISR) missions to find, identify and track ground targets; provide commanders with timely and accurate aim points for delivery of weapons; and support post-strike battle damage assessment. Real-time streaming imagery was passed from the UAV to operations personnel and a mission commander on the ground more than 100 miles away. After assessing potential targets, the commander, with a simple mouse click, told the UAV where ISR coverage was needed.

The PCES technology enabled the UAV to autonomously map its own path without operator input. Without this new technology, an operator on the ground would have had to plot the UAV’s course via waypoints to ensure that the vehicle reached and remained in the proper position to accomplish its assigned task.

PCES software enabled the UAV to gather and send additional imagery once it had arrived at the target location to provide commanders with accurate aim points and monitor the resulting weapons strikes.

The demonstration also highlighted PCES quality of service network optimization technology. The quality of service technology allowed delivery of multiple ISR imagery feeds to the mission commander over a resource-constrained data network. Based on the commander’s assigned priorities for each ISR platform, the network software managed properties of the data stream such as frame-rate, compression and latency to provide high-quality, persistent, and low-latency imagery while operating within available bandwidth.

The UAV used during the demonstration was the ScanEagle UAV. Major PCES contractors include Boeing Phantom Works, St. Louis, Mo. (ScanEagle UAV, systems integration); BBN, Cambridge, Mass. (systems integration, quality-of-service management system); Lockheed-Martin, Bethesda, Md. (systems integration); Purdue University, West Lafayette, Ind. (real-time Java for the UAV); Kansas State University, Manhattan, Kan. (model-driven development and generation tools); Vanderbilt University, Nashville, Tenn. (modeling and automatic program generation and verification tools); and Washington University, St. Louis, Mo. (modeling tools).

Defense Advanced Research Projects Agency Public Affairs

For additional information, please contact Jan Walker, (703) 696-2404, or jwalker@darpa.mil.

USJFCOM’S JOINT WARFIGHTING CENTER RELEASES NEWEST VERSION OF SIMULATION TOOL

U.S. Joint Forces Command’s (USJFCOM) Joint Warfighting Center (JWFC) released version 6.0 of the Joint Conflict and Tactical Simulation (JCATS) to its user community earlier this month.

JCATS users wanted larger exercises, they wanted to see smart munitions, active protection systems, and special operations divers in the program, and that’s what they got in the latest simulation version, according to Army Lt. Col. Andrew Riley, JWFC chief of the modeling and simulation division.

JCATS, managed by the JWFC and developed by Lawrence Livermore National Laboratory (LLNL), is a wargaming program that focuses on the tactical part of war. “It provides battlespace details for brigades and battalions who expect lots of details,” said Riley.

“Version 6.0 boosted the entity count to 80,000,” said Riley.

In modeling and simulation, an entity is a technical term for any individual, vehicle, airplane, ship. Version 6.0, which supersedes version 5.0, displays nearly 20,000 more entities.

“More entities means a more robust scenario and more support to the training audience,” which for JCATS includes all the military Services, government agencies, and 11 foreign nations, said Riley.

Version 6.0 implemented what the configuration control board (CCB) deemed to be the most important proposed enhancements. “The CCB, composed of users from the combatant commands, services and other key JCATS registered users, votes on what enhancements they would like to see implemented,” said Riley.

Some of these enhancements included:
- Active protection systems
- Smart munitions
- Shared perception for digital units

The release of version 6.0 is also contributing to the overall reduction in cost to operate and play JCATS. "We’ve
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reduced the footprint," said Riley. "What this means is that we're making it possible for one person to control more things on a work station during the simulation."

By letting a staff member implement unit movement orders and filter the orders through the echelon, we're cutting support staff from 20 people to 10 people. "It's less expensive," said Riley.

Version 6.0 has also effectively integrated the tactical level JCATS program with another simulation - Joint Theater Level Simulation (JTLS).

By integrating the two simulation programs, two separate audiences can play - those at high levels who do not need much detail and the joint audience who fight battles in a shared space - possibly in and around buildings - and who need a high level of detail.

Presently, the JCATS user community is approaching 130 users at 200 sites and growing by one-to-two sites per week. JCATS use ranges from huge warfighting scenarios for the Joint National Training Capability (JNTC) to U.S. Secret Service scenarios using just one building, according to Riley.

Jennifer Colaizzi USJFCOM Public Affairs

AIRBORNE LASER CONFORMAL WINDOW EXPOSED DURING FLIGHT

Air Force Lt. General Henry "Trey" Obering, Missile Defense Agency Director, announced today that the Airborne Laser's 1.7-meter-wide conformal window was successfully exposed during flight for the first time, a maneuver necessary for the weapon system to complete its future mission of shooting down a ballistic missile during the boost phase. The conformal window exposure occurred on May 17 during the eighteenth flight in the current test series for the Airborne Laser aircraft. The window, which is shaped like a huge contact lens, took five years to manufacture and is one of the most complex optics ever developed. It is mounted in a rotating turret-ball assembly on the nose of the Airborne Laser aircraft. During takeoff and landing, the window is rotated into the "stowed" position where it is protected by a gasket and shield. During an operational mission, three of the four lasers that propagate outside the aircraft, including the megawatt-class "killer" laser, are fired through the conformal window. Although the lasers have not yet been installed aboard the aircraft, the exposure test, referred to as "unstowing the turret ball," is an important part of the flight test series being conducted this year. The Airborne Laser is one of the boost-phase segments of the overall integrated missile defense system, being developed to defend the United States, its allies and its deployed troops from ballistic missile attack.

Ken Englade, ABL Public Affairs – 505-846-7681

DoE ANNOUNCES $64 M IN HYDROGEN RESEARCH & DEVELOPMENT PROJECTS

Secretary of Energy Samuel W. Bodman today announced the selection of over $64 million in research and development projects aimed at making hydrogen fuel cell vehicles and refueling stations available, practical and affordable for American consumers by 2020.

A total of 70 hydrogen research projects have been selected to focus on fundamental science and enable revolutionary breakthroughs in hydrogen production, and storage in addition to new fuel cell technologies. Participants in the projects include more than 50 research organizations in 25 states. The organizations include academic institutions, industry, and national laboratories.

The initiatives announced today are part of a comprehensive, balanced portfolio of basic and applied research, technology development, and learning demonstration projects aimed to significantly advance President Bush’s Hydrogen Fuel Initiative. The projects were selected through an open, merit-reviewed, competitive solicitation process. A total of $64 million over three years will be provided by the Department to these entities, subject to Congressional appropriations.

The following projects address the five technical focus areas identified during the Department of Energy’s May 2003 workshop on “Basic Research Needs for the Hydrogen Economy”:

Novel Materials for Hydrogen Storage (17 projects, $19.8 million over three years)

On-board hydrogen storage has been identified by both the National Academy of Sciences and the DOE as a key technology for the successful implementation of a hydrogen economy. However, significant scientific challenges remain, highlighting the need for further basic research.

Within the hydrogen storage topic, 17 projects will be awarded to 10 universities and 6 national laboratories. A broad range of research in hydrogen storage is covered by these selected projects, including complex hydrides; nanostructured and novel materials; theory, modeling, and simulation; and state-of-the-art analytical and characterization tools to develop novel storage materials and methods.

Membranes for Separation, Purification, and Ion Transport (16 projects, $12.3 million over three years)

Novel membranes are needed to selectively transport atomic, molecular, or ionic hydrogen and oxygen for hydrogen production and fuel cell applications. The 16 projects selected, which include 13 universities and 3 national laboratories, address integrated nanoscale architectures; fuel cell membranes; and theory, modeling, and simulation of membranes and fuel cells. Catalyst Design at the Nanoscale (18 projects, $15.8 million over three years)
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Catalysis plays a vital role in hydrogen production, storage and use. Specifically, catalysts are needed for converting solar energy to chemical energy, producing hydrogen from water or carbon-containing fuels such as coal and biomass, increasing efficiency in hydrogen storage kinetics, and producing electricity from hydrogen in fuel cells. Nanoscale catalyst designs will be explored through 18 projects involving 12 universities and 5 national laboratories. Research areas include innovative synthetic techniques; novel characterization techniques; and theory, modeling, and simulation of catalytic pathways.

Solar Hydrogen Production (13 projects, $10 million over three years)

Efficient and cost-effective conversion of sunlight to hydrogen by splitting water is a major enabling technology for a viable hydrogen economy. Hydrogen production via solar energy conversion will be studied through 13 projects at 8 universities, 1 industry company, and 3 national laboratories. The projects address nanoscale structures; organic semiconductors and other high performance materials; and theory, modeling, and simulation of photochemical processes.

Bio-inspired Materials and Processes (6 projects, $7 million over three years)

Fundamental research into the molecular mechanisms underlying biological hydrogen production is the key to our ability to adapt, exploit, and extend what nature has accomplished for our own renewable energy needs. Bio-inspired materials and processes for hydrogen production will be investigated through 6 projects at 5 universities and 1 national laboratory. Research includes enzyme catalysis; bio-hybrid energy coupled systems; and theory, modeling, and nanostructure design.

http://www.sc.doe.gov/bes/hydrogen.html

SUPERCONDUCTIVITY GROUP DEMONSTRATES THAT LESS CAN BE MORE

AFRL's Superconductivity Group recently demonstrated for the first time that minute additions (< 1%) of certain divalent rare earth elements can improve the properties of YBCO (yttrium barium copper oxide) superconducting films. Previously, larger percentage additions (e.g., 10%, 20%, etc.) had been used by the superconductor community for altering the superconducting properties of rare earth barium cuprate superconductors, as small percentage additions were considered to have little effect. The divalent elements terbium (Tb), cerium (Ce), and praseodymium (Pr) have shown to be detrimental when added in these larger quantities and were consequently ignored. However, the Propulsion Directorate’s Dr. Paul Barnes recognized the potential use of the detrimental nature of these elements. He determined that if used in small quantities well dispersed throughout the YBCO superconductor, they can act as nanopinning centers and improve the critical current. Mr. Joseph Kell, an AFRL/PR co-op student working on his Master’s thesis, recently demonstrated that this hypothesis is indeed true (with Ce and Tb), as higher in-field critical currents were realized. The Superconductivity Group is currently optimizing the result to determine the maximum improvement possible via this method, and testing will soon begin on Pr doped samples. This research supports the development of high temperature superconducting (HTS) technology, which is an essential element needed for the design and development of future advanced, compact, high-power generator coils for aerospace applications, such as directed energy weapons. (Dr. P. Barnes, AFRL/PRPG)

http://www.pr.afrl.af.mil/

NIST METHOD IMPROVES TIMING IN OSCILLOSCOPES

A new method for correcting common timing errors in high-speed oscilloscopes has been developed by researchers at the National Institute of Standards and Technology (NIST). The method improves the accuracy and clarity of measurements performed in the development and troubleshooting of components for wireless and optical communications, military radar and other technologies. Oscilloscopes display graphical representations of electrical and optical signals as waves, showing how the signals change over time. These instruments often have inaccurate internal clocks that distort output patterns, and they also can exhibit random timing errors called jitter. These errors may lead, for example, to false detection of failure in a communications module that is actually working, or to increased electronic "noise" interference with measurements of microwave signals from radar.

The NIST method, based on an approach developed in laboratory experiments and implemented in freely available software, constructs an alternative time base. The software analyzes an oscilloscope's measurements of both a signal of interest and two reference waves that are offset from each other. The reference waves are generated by an external device and are synchronized in time with the signal being measured. Measurements of the reference waves are compared with a calculation of an ideal wave to produce an estimate of total time errors due to distortion and jitter. These errors then can be corrected automatically for each measurement made by the oscilloscope.

The NIST correction method can be applied to older standard equipment, can correct time records of almost any length and can be applied to electromagnetic signals at almost any frequency. It also provides the user with an estimate of the residual timing error after the correction process has been completed. The Timebase Correction software package is available free of charge at www.boulder.nist.gov/div815/HSM_Project/Software.htm.

NIST Office of Public Affairs
Electromagnetic Launch Short Course
August 8 - 11, 2005
Austin Texas
The Institute for Advanced Technology (IAT) at The University of Texas at Austin has been selected by the US Army to conduct a course in electromagnetic launch technology. This course is designed for, and attendance is limited to, DoD personnel and DoD contractors who are US citizens.

The ability to use electromagnetic energy to controllably propel objects to extremely high speeds has broad and important consequences for many elements of our society, including transportation, communications, energy, national defense, and space. The objective of the Electromagnetic Launch Short Course is to provide a comprehensive understanding and ability to articulate the engineering and scientific knowledge of electromagnetic launch technologies. During this three-day course, engineers and scientists will work directly with electromagnetic launch subject matter experts to comprehend:

- Electromagnetic launch
- Hypervelocity projectile technology
- Pulsed power supply
- High-power switching
- History, challenges, and design of current technology programs

Continuing Educational Units (CEUs): This course has been approved by the International Association for Continuing Education and Training (IACET). Upon completion of the course, students will earn 1.9 hours of Continuing Educational Units (CEU).

Registration
Attendance is limited to DoD personnel and DoD contractors who are US citizens.
Registration Fee: $750
Registration is due: July 29, 2005.
There will be no on-site registration.

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Publications of interest
Effects of Nuclear Earth-Penetrator and Other Weapons
Committee on the Effects of Nuclear Earth-Penetrator and Other Weapons
National Research Council May 2005
Underground facilities are used extensively by many nations to conceal and protect strategic military functions and weapons stockpiles. Because of their depth and hardened status, however, many of these strategic hard and deeply buried targets could only be put at risk by conventional or nuclear earth penetrating weapons (EPW). Recently, an engineering feasibility study, the robust nuclear earth penetrator program, was started by DOE and DOD to determine if a more effective EPW could be designed using major components of existing nuclear weapons. This activity has created some controversy about, among other things, the level of collateral damage that would ensue if such a weapon were used. To help clarify this issue, the Congress, in PL. 107-314, directed the Secretary of Defense to request from the NRC a study of the anticipated health and environmental effects of nuclear earth-penetrators and other weapons and the effect of both conventional and nuclear weapons against the storage of biological and chemical weapons. This report provides the results of those analyses. Based on detailed numerical calculations, the report presents a series of findings comparing the effectiveness and expected collateral damage of nuclear EPW and surface nuclear weapons under a variety of conditions.
Prepublication Version Available for Online Reading
http://www.nap.edu/catalog/11282.html

Re-examining Military Acquisition Reform Are We There Yet?
Christopher Hanks, et. al.
Published 2005 by the RAND Corporation
The research was sponsored by the United States Army and conducted by the RAND Arroyo Center.
In the Department of Defense, 63 distinct acquisition reform (AR) initiatives were undertaken from 1989 to 2002. By looking at what the AR movement “was” in the 1990s (by describing the initiatives launched under its name) and by letting acquisition personnel describe in their own words how their work was affected by those initiatives, the authors seek to shed light on what the AR movement has and has not accomplished in terms of changing the way the acquisition process works.
http://www.rand.org/publications/MG/MG291/
Directed Energy Weapons Course

Instructor: Dr. Edward Scannell, WSTIAC

Location: Huntsville, Alabama
24 February, 18 May, 10 August, 16 November 2005

Course Description:
This one-day classified short course provides an introduction to the basic principles and techniques of Directed Energy Weapons (DEWs). The technologies behind each type of DEW will be examined, and the critical path components will be identified and explored with respect to their effect on future DEW development. In addition, advantages that can be achieved by employing DEWs will be discussed, as well as the status of U.S. and foreign DE developments and deployments. The key DEW programs in High Energy Lasers and RF-DEWs or High Power Microwaves will be fully described.

This short course will be of great benefit to people who need to understand the basic concepts, technologies, design requirements and practical applications of DEWs, including program and business managers, political decision makers, engineers, scientific researchers and military personnel. An undergraduate technical degree is recommended. Mathematics is kept to a minimum, but important formulas are introduced.

Questions to be examined include:

- What is Directed Energy and what are the different types of Directed Energy Weapons?

- What are the advantages and disadvantages of each type of DEW and what are their target effects and tactical and strategic capabilities?

- How do DEWs work and what are the critical technologies that must be developed for their eventual use in practical systems?

- How may threat DEW effects be countered and how can we protect our own systems?

- What are the major U.S. and international DEW programs that are being pursued?

- What is the prognosis for future DEW development?

About the Instructor:
Dr. Edward Scannell is the Senior Program Manager of the Engineering & Technical Division, Chief Scientist for WSTIAC, and formerly Chief of the Directed Energy and Power Generation Division of the U.S. Army Research Laboratory. He has 30 years of experience in technical areas related to DEWs, including: plasma physics; conventional and alternative energy sources, electromagnetic (EM) guns, particle beam, laser, high power microwave (HPM), and pulse power physics.

Security Classification:
The information presented is kept at the unclassified level, but is designated export controlled and limited to U.S. citizens only. The security classification of this course is UNCLASSIFIED.

Training at Your Location:
WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:
$700.00 for government personnel; $800.00 for government contractors.

Handout Material:
Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail
khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.
Introduction to Sensors and Seekers for Smart Munitions and Weapons Course
Instructor: Mr Paul Kisatsky, WSTIAC
Location: Huntsville, Alabama
19-21 April, 7-9 June, 18-20 October, 6-8 December 2005

Course Description:
This 3-day short course provides an introduction to the most commonly used sensors and seekers employed in smart munitions and weapons (projectiles, missiles and wide area mines). It is oriented to managers, engineers, and scientists who are engaged in smart weapons program development and who desire to obtain a deeper understanding of the sensors they must deal with, but who do not need to personally design or analyze them in depth. An undergraduate technical degree is recommended. Mathematics is kept to a minimum, but important formulas are introduced. This course also provides an excellent foundation for those scientists and engineers who desire to pursue this discipline to intermediate and advanced levels.

The course covers:
- Classification of seekers and sensors
- Fundamentals of waves and propagation
- Fundamentals of noise and clutter
- Fundamentals of search footprints
- Introduction to infrared
- Introduction to radar
- Introduction to lidar
- Introduction to visionics
- Introduction to acoustics
- Future projections and interactive brainstorming

Noise and clutter, the predominant obstacles to success in autonomous seekers, are given emphasis. The major sensor types are classified and each is discussed. In particular, infrared, radar, optical laser radar (lidar), imaging and non-imaging, and acoustic sensors are individually covered. Of special interest is the discussion on human visionics versus machine recognition, since this concept is of central importance to understanding autonomous versus man-in-the-loop sensing systems. The implications of "artificial intelligence", "data fusion", and "multi-mode" sensors are also briefly discussed. System constraints, which force tradeoffs in sensor design and in ultimate performance, are also covered. Time permitting, a projection of future trends in the role of sensors for smart munitions will be presented, followed by a "brain-storming" session to solicit student views.

About the Instructor:
Mr. Paul Kisatsky is a Senior Physical Scientist. He is a nationally recognized expert on sensors and seekers for smart munitions and weapons and has more than 30 years of hands-on experience developing sensors and seekers fielded in modern smart munitions and weapons.

Security Classification:
This course is unclassified.

Training at Your Location:
WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:
The registration fee for this 3-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:
Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator, at (256) 382-4747, or by e-mail khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.
Weaponeering Course

Instructor: Professor Morris Driels, US Naval Postgraduate School

Location: Huntsville, Alabama
29-31 March, 21-22 June, 4-6 October, 29 November - 1 December 2005

Course Description:
This 2½-day short course is based on a very successful graduate-level weaponeering course developed by Professor Driels and taught at the Naval Postgraduate School (NPS), Monterey, CA. The course will provide an overview of the fundamentals of the weaponeering process and its application to air-to-surface and surface-to-surface engagements. The course explains the analytical basis of current weaponeering tools known as the Joint Munitions Effectiveness Manuals (JMEMs) produced by the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME). The JMEMs are used by all Services to plan offensive missions and allow the planners to predict the effectiveness of selected weapon systems against a variety of targets.

The short course is divided into three parts.

Part I covers the basic tools and methods used in weaponeering:
- The weaponeering process
- Elementary statistical methods
- Weapon trajectory
- Delivery accuracy of guided and unguided munitions
- Target vulnerability assessment

Part II covers the weaponeering process for air-launched weapons against ground targets:
- Single weapons directed against point and area targets
- Stick deliveries (point and area targets)
- Projectiles (guns and rockets)
- Cluster munitions
- Weaponeering for specific targets: bridges, buildings, etc.
- Collateral damage modeling

Part III covers the weaponeering process for ground engagements:
- Indirect fire systems - artillery and mortars.
- Direct fire systems - infantry and armored vehicles.

About the Instructor:
Professor Driels is a Professor of Mechanical Engineering at the U.S. Naval Postgraduate School in Monterey, California. He has worked with the JTCG/ME on a variety of topics in support of the JMEMs for a number of years. He has taught a quarter-long weaponeering course at NPS for three years and he has published a textbook on the subject.

Security Classification:
The security classification of this course is UNCLASSIFIED.

Training at Your Location:
WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:
The registration fee for this 2½-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:
Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator,
at (256) 382-4747, or by e-mail khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.
Smart/Precision Weapons Course

Instructors: Mr. Hunter Chockley and Mr. Mark Scott, WSTIAC
Location: Huntsville, Alabama

1-3 March, 24-26 May, 26-28 July, 13-15 September, 1-3 November 2005

Course Description:
This 2½-day short course provides a comprehensive understanding of smart weapons and related technologies. This course is aimed at providing general knowledge about smart weapons technology and a source of current information on selected U.S. and foreign smart weapons, to include system description, concept of employment, performance characteristics, effectiveness and program status.

A variety of ground, sea and air smart/precision weapon systems are discussed, to include fielded and/or developmental U.S. systems such as Joint Direct Attack Munition (JDAM), Joint Air-to-Surface Standoff Missile (JASSM), Small Diameter Bomb, Javelin, Line-of-Sight Anti-Tank (LOSAT), XM982 Excaliber, Extended Range Guided Munition (ERGM), Common Missile, Tomahawk, Standoff Land Attack Missile - Expanded Response (SLAM-ER), Cluster Bomb Munitions and Airborne Laser, among others, as well as representative foreign smart/precision weapons.

The objective of this course is to inform materiel and combat developers, systems analysts, scientists, engineers, managers and business developers about smart/precision weapons, to include:

- State-of-the-art of representative U.S. and foreign smart weapons systems;
- Employment concepts
- Smart weapons related systems, subsystems, and technologies; and
- Technology trends.

About the Instructors:
Mr. Mark Scott and Mr. Hunter Chockley are Science Advisors. Each instructor has more than 25 years of experience with weapons technology and/or smart/precision weapons.

Security Classification:
The information presented is kept at the unclassified level, but is designated FOR OFFICIAL USE ONLY (FOUO), export controlled, and attendance is limited to U.S. citizens. The security classification of this course is UNCLASSIFIED.

Training at Your Location:
WSTIAC can conduct this course at your location to reduce your travel time and cost. Please call Mrs. Kelly Hopkins to discuss.

Fee:
The registration fee for this 2½-day course is $950 for U.S. government personnel and $1150 for government contractors. Contractor teams of 3 or more, registered at the same time, are charged $950 per person.

Handout Material:
Each student will receive a comprehensive set of course notes covering the material presented.

For additional information, contact:
Mrs. Kelly Hopkins, Seminar Administrator, at (256) 382-4747, or by e-mail khopkins@alionscience.com

Notice: WSTIAC reserves the right to cancel and/or change the course schedule and/or instructor for any reason. In the event of a schedule change or cancellation, registered participants will be individually informed.
**Upcoming Conferences and Courses**

**June 2005**

- **27-29 June 2005**
  Institute Of Navigation 61st Annual Meeting
  Cambridge, MA
  For additional information:
  http://www.ion.org/meetings/am2005cfa.cfm

**July 2005**

- **11-14 July 2005**
  SIAM Conference on Control and Its Applications
  New Orleans, LA
  http://www.siam.org/meetings/c05/index.htm

- **18-22 July 2005**
  Michigan Chapter Army Power & Energy Conference
  Troy, MI
  For additional information:
  http://register.ndia.org/interview/register.ndia?PID=Brochure
  &SID=_1HV0UQ8AG&MID=C484

- **19-21 July 2005**
  2005 International Conference on MEMS, NANO, and Smart Systems
  Banff, AB, Canada
  For additional information:
  http://www.icmens.org/ICMENS2005/

- **25-27 July 2005**
  Philadelphia, PA
  For additional information:
  http://ewh.ieee.org/conf/estss05/

- **31 July-4 August 2005**
  2005 International Joint Conference on Neural Networks (IJCNN 2005 - Montreal)
  Montreal, QC, Canada
  For additional information:
  http://faculty.uwb.edu/ijcnn05/index.html

**August 2005**

- **1-4 August 2005**
  2005 Tri-Service Infrastructure Systems Conference & Exhibition
  “Re-Energizing Engineering Excellence”
  St. Louis, MO
  For additional information:
  http://register.ndia.org/interview/register.ndia?PID=Brochure
  &SID=_1HV0UQ8AG&MID=5150

- **15-18 August 2005**
  Tennessee Valley Space & Missile Defense Conference & Exhibit
  Huntsville, AL
  For additional information:
  http://register.ndia.org/interview/register.ndia?PID=Brochure
  &SID=_1HV0UQ8AG&MID=C466

- **15-18 August 2005**
  San Francisco, CA
  For additional information:
  http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1090

- **15-18 August 2005**
  2005 Warheads and Ballistics Classified Symposium
  SECRET/NOFORN
  Monterey, CA
  For additional information:
  http://register.ndia.org/interview/register.ndia?PID=Brochure
  &SID=_1HV0UQ8AG&MID=5480

- **15-18 August 2005**
  AIAA Guidance Navigation and Control Conference
  San Francisco, CA
  For additional information:
  http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1089

- **15-18 August 2005**
  3rd International Energy Conversion Engineering Conference
  San Francisco, CA
  For additional information:
  http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1090

**September 2005**

- **7-9 September 2005**
  2005 IEEE Vehicle Power and Propulsion Conference (VPPC)
  Chicago, IL
  http://vpp.iit.edu/

**October 2005**

- **18-20 October 2005**
  Weapon System Effectiveness (Classified - U.S. Only)
  Austin, TX
  http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1242&viewcon=submit