



**PRECISION STRIKE
ASSOCIATION**
Affiliate, National Defense
Industrial Association

VISION STATEMENT

We aspire to be the premier association dedicated to advancing the art and science of precision engagement concepts and technology.

To accomplish this, we will promote the development of systems and procedures in order to locate, fix, track, target, and attack fixed, moving, and relocatable targets.

We recognize that battlespace management, the network within which it functions, and the adjunct command and control requirements are crucial to success on the battlefield.

PSA has a global perspective and welcomes international participation.

PEO Summer Forum to Showcase Integration & Interoperability

The Precision Strike Association will be hosting a PEO Summer Forum at the Patuxent River Naval Air Station Rivers Edge Conference Center on June 12-13, 2012. The symposium will be a two-day event, preceded by the 2nd Annual PSA Golf Event on June 11, 2012.

The theme of this event will be *Integration and Interoperability... Getting More from Less*. We will be addressing the What, When, Where, Why, and How of Integration and Interoperability... What does integration and interoperability mean, Why is it so important, How do we achieve integration and interoperability, Where have we seen successes, and When will we be seeing more?

We will touch on all aspects of integration and interoperability. We will address integration and interoperability from an acquisition perspective (e.g., how do we do requirements definition, budgeting, and test and evaluation), from an operational perspective (e.g., what are the problems we see and what has worked), and from a technical perspective (e.g., what are



VADM David Architzel, USN



MGEN Ken Merchant, USAF

some industry solutions and what challenges does industry see).

There will a rich variety of speakers at the PEO Summer Forum. VADM David Architzel, USN, will kick off the event on the morning of June 12. In addition to his current assignment as Commander, Naval Air Systems Command, VADM Architzel has served as Program Executive Officer for Aircraft Carriers; Commander, Operational Test and Evaluation Force, Norfolk; Commander, Navy Region Mid-Atlantic; Commander, Naval Safety Center, Norfolk; and Commander, Iceland Defense Force and Commander, Fleet Air Keflavik.

Major General Ken Merchant, USAF, has accepted our invitation to Keynote the event. MGEN Merchant is Commander, Air Armament Center, and Air Force Program Executive Officer for Weapons, Air Force Materiel Command, Eglin AFB, FL. Prior to his current assignment he was Director of Logistics,

See **PEO Summer Forum**, Cont. on pg. 14

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PRECISION STRIKE SUMMER GOLF OUTING

To benefit the Precision Strike Association and Walter Reed National Military Medical Center

MONDAY JUNE 11, 2012

Cedar Points Golf Course: Naval Air Station Patuxent River 22268 Cedar Point Rd, Patuxent River, MD 20670



SCHEDULE OF EVENTS:

- 1100** Arrival, Registration and Range
- 1145** Opening remarks
- 1200** Shotgun Start for Golf * (Captain's Choice Scramble Format)
- 1630** (approximately) Golf Awards immediately following golf

*Golf is limited to the first 100 entries received. **Deadline for registration is June 4, 2012.**

SPONSORSHIP OPPORTUNITIES:

- GOLD CORPORATE SPONSORSHIP \$ 1500**
(2) Golf Foursome Registrations; (2) Hole Sponsorships
Complimentary Registrations the for PEO Forum and PEO Forum Sponsorship
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OTHER SPONSORSHIP OPPORTUNITIES:

- Refreshment Sponsorship: **\$400**
- Individual Hole Sponsorship: **\$300**
- Closest to Pin or Longest Drive Sponsor: **\$100**
- Giveaways for golfer goody bags and/or door prizes: **Any sponsor items welcome!**

INDIVIDUAL RATES FOR GOLF ONLY:

Industry	\$80
Small Business	\$70
Military/Government	\$60

For more information on the golf event or the PEO Forum or to download registration & sponsorship forms, please visit our website: www.precisionstrike.org or contact Dawn Campbell by email at dcampbell@precisionstrike.org or 703-247-2590.

PSAR 2012 Wrapup

The Precision Strike Association (PSA) held its Precision Strike Annual Review (PSAR-12) March 20-21, 2012 at the Emerald Coast Conference Center, Ft. Walton Beach, FL. This premier event was co-hosted by the Air Armament Center (AAC) and the Air Force Research Laboratory (AFRL), at nearby Eglin AFB. Organized by Andy McHugh, PSA Chairman of the Board, Ginny Sniegion (PSA Programs Chair) and Annual Review Tri-Chairs (Ginny Sniegion, Dale Spencer and Dr. John Wilcox, the AFRL's Associate Director for Weapons), the very successful two-day event held the theme *Weapons Reform—Adapting Acquisition Processes for Today*.

PSAR-12 focused on the current challenges and the importance of continuing to deliver value for the warfighter. It showed how the U.S. military is adapting acquisition processes for weapons reform by ensuring further improvements in the acquisition of weapons systems by making affordability a requirement and by seeking to eliminate redundant mission capability portfolios.

Colonel Ken Echternacht, USAF, Deputy Director, Armament Directorate, extended a warm welcome to the PSAR-12 participants to the beautiful Emerald Coast. He highlighted the focus of the exciting two-day program that would concentrate on current defense strategies in Iraq and Afghanistan with a shift to the Far East. The Colonel noted that the current thrusts in precision strike would be discussed “with the knowledge that we are under significant budgetary constraints.” Further, he noted that future weapons development and procurement will need to be “on time, on cost and affordable.”

Major General Ken Merchant, USAF, Commander, Air Armament Center, delivered the opening keynote address. He offered a status report on the development of various precision strike weapons and the better buying power initiatives in place.

The portfolio of long-range strike weapons include the JASSM-ER and the SDB II, a close controlled strike weapon. The Hard Target Munition (HTM), formerly known as the Next Generation Penetrator, remains under development, but R&D funding

for the Next Generation Missile (NGM) was eliminated from this year's defense budget request.

“NGM fell off the table. With the budget constraints, something had to go,” said Merchant. But the USAF will continue to evolve the technologies needed for a follow-on to the medium range AMRAAM air-to-air missile.

Merchant said a next-generation Offensive Anti-Surface Warfare (ASuW) weapon is being worked with the U.S. Navy and could be a maritime variant of JASSM. A Next Generation Direct Attack Weapon wouldn't be fielded until the 2030 timeframe. It might incorporate advanced guidance systems, a precision selectable effects warhead and perhaps high-speed expendable propulsion.

Keeping to the PSAR-12's theme, Merchant said DoD can no longer initiate or carry unaffordable weapons programs. “We continue the never-ending quest to control and reduce our costs. We can only support high payoff programs,” he believes. His final thought: Programs that can't keep up will not survive.

Mark “Slick” Simpson, Senior Strategy Analyst, Strategic Planning Munitions Directorate, AFRL, considered strategic planning for precision engagement. He said S&T focus areas must include countering anti-access/area-denial (A2AD) challenges that are expanding globally. “The world is changing. The luxury of air superiority is diminishing. Anti-access will drive us to project power at greater distances and area denial will place our platforms and weapons in jeopardy,” he believes.

Randy Brown, Director, Armament Directorate, discussed ‘survival’ in the context of today's tight budget environment. “We must make sure at the end of the day that we are getting the best deal for the taxpayer. We must balance requirements against costs to get the best value,” he said.

Volume also helps, he added, advocating foreign military sales and joint programs with the other U.S. military services to beef up overall production. “The U.S. defense budget is shrinking. We are competing for resources and dollars. We need to show value for what we are doing. We need to sharpen our pencils,” Brown stated.

Reuben Manasco, recently retired as the Director of the Acquisition Excellence Directorate, AAC, is no stranger to acquisition reform initiatives. Having spent four



Colonel Ken Echternacht, USAF



Major General Ken Merchant, USAF



Mark “Slick” Simpson



Randy Brown

decades managing USAF weapons programs, he discussed the various schemes that were implemented to improve weapons R&D and acquisition. Total Package Procurement was followed by Fixed Price Developments and Second Sourcing. The 90s brought on Total System Performance and Responsibility. TSPR disappeared in 2000 with the return of Fixed Price Developments.



Reuben Manasco

What of the future? Manasco says “a return to TSPR or something like it may be dictated along with another round of industry consolidation.” He likes to say “you either get larger, smaller or go out of business.” And, the acquisition veteran believes 1) those who do not study the past are doomed to repeat it and 2) the more things change the more they stay the same.

Lunch followed Manasco’s presentation, after which **Dr. Peter Huessy**, President of Geostrategic Analysis, a defense consulting firm, said “poisonous coalition-states” are behind terrorist groups, including al Qaeda, Hamas, Hezbollah and FARC.



Dr. Peter Huessy

He spoke in advance of North Korea’s failed launch of an Unha-3 rocket. The North Korean government insisted that the rocket carried an Earth observation satellite, though other countries said it was a cover for testing long-range missile technology. “These folks play this game really well,” said Huessy.

The rocket test is of particular concern to Washington because North Korea is believed to have at least a crude nuclear weapons program, and if it can develop a reliable intercontinental ballistic missile and a nuclear bomb small enough to use as a payload, it could be a threat to neighboring nations and the U.S.

Dr. Huessy repeated his concern that a terrorist group could explode a small nuclear weapon off the U.S. East Coast, a blast that could produce an electromagnetic pulse (EMP), a burst of electromagnetic radiation affecting Boston to Atlanta.

The resulting rapidly-changing electric fields and magnetic fields could couple with electrical/electronic systems to produce damaging current and voltage surges that could shut down the electric grid, paralyzing the national critical infrastructure (power, communications, transportation, banking and finance).

Colonel Mike “Hans” Gantt, USAF, Division Chief, A5XS “Skunks”



Colonel Mike Gantt, USAF

Concepts, Strategy & Wargaming, HQ, USAF, outlined the Air-Sea Battle Concept, which is more of an integrated battle concept now that all the U.S. military services are involved.

The concept is intended to drive an integrated U.S. military as it embraces an evolving A2AD environment.

“The concept is moving forward to integrate what we do, so that the joint warfighter is truly the joint warfighter,” he said. Areas for technology development to support the concept include long-range strike/standoff capabilities, low observable technology and remote piloted vehicles, he added.



Major Craig McDermott, Brian Kelly and Kerry Neace

Major Craig “Pebbles” McDermott, USMC, Air-to-Ground Requirements Office, OPNAV N98, **Brian Kelly**, OASuW IPT Lead, PMA-201 and **Kerry Neace**, Kinetic Engagement Programs Area Manager, JHU/APL, discussed current development of naval precision weapons.

Kelly led off, discussing Net Enabled Weapons (NEW) in support of ASuW. They include the in-development Raytheon Joint Standoff Weapon (JSOW) C-1 and the Boeing Harpoon Block II+, with initial fielding in FY 2013 and 2017, respectively.

McDermott briefed on the air-to-ground weapons roadmap that does not include a Joint Air-to-Ground Missile (JAGM) that was eliminated from the current budget request. The tri-service program had involved production of nearly 34,000 of the missiles worth \$6.8 billion.

Neace discussed how capabilities based acquisition would offer significant efficiencies and affordability in meeting the weapon acquisition challenge in an austere fiscal environment. He said methods exist in systems engineering best practices to guide system-of-system based development.

The final presentation on the first day of PSAR-12 was by **Dr. Scott Maley**, Senior Operations Research Analyst, Force Support Division (J-8), The Joint Staff, who outlined how the Joint Capabilities Integration and Development System (JCIDS) Manual released in January will help improve the process for requirements identifica-



Dr. Scott Maley

tion and development. He said the revised JCIDS Manual reflects the new “fiscal reality” and remains a work in progress with further revisions unveiled in late 2012 or early 2013.

Colonel Michael Schmidt, USAF, PEO for Fixed Wing, U.S. Special Operations Command, opened the second day of PSAR-12 with his perspectives on U.S. SOCOM’s rapid acquisition culture and how it is being applied to development and procurement of the AC-130J, which is leveraging from the MC-130J and MC-130W Dragon Spear projects. He said USSOCOM could use better moving target attack capability, which might be a Small Diameter Bomb with a laser seeker.



Colonel Michael Schmidt, USAF



The International Precision Weapons Panel

The International Precision Weapons Session, chaired by **PSA Board Member Earle Rudolph** worked along two precise tracks: F-35 weapons load out and Columbia’s use of precision strike for anti-drug trafficking and its war on terrorism.

The former was a presentation by **Colonel Mark Werth, USMC** who said future weapons (Block 4) for the F-35A/B/C Joint Strike Fighter (JSF) include the SDB II, JSOW-C1, Norwegian Joint Strike Missile (JSM) and the Turkish Stand-Off Missile (SOM).

The latter discussion followed up on the international session’s theme for PSAR-11. **Columbian Air Force Lieutenant Colonel Jaime Valencia Monsegny**, Air Group Combat Command, Barranquilla Air Base, spoke through an interpreter, **USAF Lt Colonel Charles Gerstenecker**, an air attaché at the American Embassy in Bogotá.

He described how a typical tactical mission would be conducted using Paveway-armed A-37Bs, A-29B Super Tucanos with gravity bombs and a forward looking infrared-equipped C-208 Grand Caravans providing oversight.



COL Mark Werth, USMC



Gary Bliss

Offering the keynote address on the second day of PSAR-12 was **Gary Bliss**, Director, Performance Assessments & Root Cause Analyses, ASD(A), OUSD/AT&L. It is his job to scrutinize why defense acquisition programs fail. Eighteen case studies have been conducted since his congressionally mandated office was created two years ago.

Tasked with finding “actionable lessons” for the acquisition system, Bliss said problems occur both during program inception and execution. He listed quantity changes, poor systems engineering and unrealistic cost estimates among the reasons for cost overruns.



The Army Precision Weapons Panel

The Army Precision Weapons Session was chaired by **LTC Ken Britt, USA (Ret)** and included presentations by **Colonel Gary Stephens, USA, LTC Mike Milner, USA, and Bruce Miller.**

Colonel Stephens, PM for Precision Fire, Rockets, said the U.S. Army may develop an Army Tactical Advanced Missile (ATAM) since “it appears that there may be a capability gap in long range fires.” ATAM might include new motor technology and an advanced fuse. He said a request for information (RFI) yielded “great feedback” from industry. Army officials are now considering trade space for warhead effects, range and weapon load out.

LTC Milner, the Excalibur PM, said Increment Ib of the ‘smart’ 155mm artillery round, which is in engineering and manufacturing develop, will provide a lower cost, increased reliability Excalibur. Production of the M982E1/A1 round will begin in 2QFY13. Miller, who manages munitions war reserve requirements for HQDA, outlined how the U.S. Army determines its requirements for precision munitions.

While Colonel Werth limited his remarks to weapons for the F-35, integrated training for F-35 pilots and support personnel was discussed by **Colonel Andrew “Drifter” Toth, USAF**, the 33rd Wing Commander at Eglin AFB. He is charged with training new Navy, Marine Corps, Air Force and allied F-35 Lightning II pilots and maintainers



Colonel Andrew “Drifter” Toth, USAF

for all three versions of the new fighter: conventional takeoff and landing, short take off and vertical landing, and carrier variants.

The final expert panel of PSAR-12 kept to the overall theme of the meeting, exploring the effects of current acquisition policies on weapons systems acquisition. NDIA Gulf Coast Chapter members **Frank Robbins**, **Bob Marinan** and **Dave Andrews** considered systems engineering in a fixed price environment and its potential pitfalls. Marinan reminded the PSAR-12 attendees why the fixed-price Navy A-12 stealthy ground attack aircraft



Frank Robbins, Bob Marinan and Dave Andrews

project was cancelled. Andrews said “neither the government nor contractor is used to the discipline required to manage a fixed price development contract.” ■



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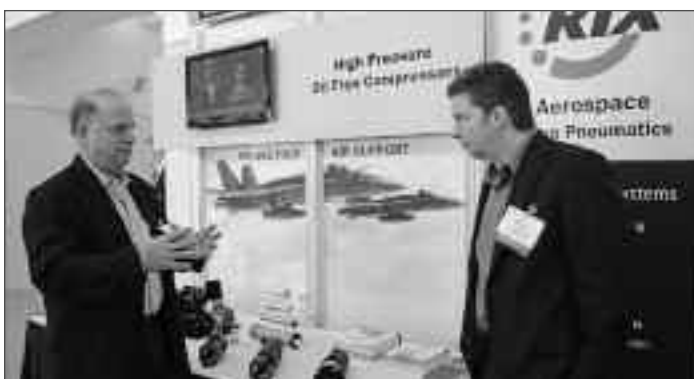
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ABL Flies into History Books

The aircraft known for turning science fiction into fact, the YAL-1A Airborne Laser Test Bed, departed Edwards AFB Feb. 14, 2012, for its final ferry flight to Davis-Monthan AFB, AZ.

The ALTB is a modified Boeing 747-400 Freighter that housed two solid-state lasers and a megawatt-class chemical oxygen iodine laser that could use directed energy as a viable technology against ballistic missiles. Feb. 14 represented the end of a historic era in airborne directed energy research as the test program closed.

One of ALTB's significant tests involved the successful engagement

and destruction on Feb. 3, 2010, of a boosting solid-fueled Terrier Black Brant rocket that was launched from the ground on San Nicolas Island, CA. The rocket simulated a threat-representative ballistic missile. The test proved the viability of directed energy for missile defense.

The ALTB has been processed into storage at the Air Force's Aerospace Maintenance and Regeneration Group, also known as the "Boneyard." Over the past two years, The Missile Defense Agency's Directed Energy Program Element



YAL-1A's final departure from Edwards AFB

continued to receive reduced appropriations. In consideration of the reduced

funds, MDA began program closeout and awarded a contract for storage.

Boeing, the prime contractor for the airborne laser program, provided the aircraft and the battle management system and oversaw the testing. Northrop Grumman developed the chemical oxygen iodine laser. Guiding the laser was a computer-controlled mirror designed by Lockheed Martin. ■

F-35 Weapons Testing Underway



On Feb. 16, 2012, the first external weapons test mission was flown by an F-35A Conventional Takeoff and Landing (CTOL) aircraft at Edwards AFB, CA. The weapons load included: two AIM-9X missiles, two internal 2,000-pound guided bombs (GBU-31) and two advanced medium range air-to-air missiles (AIM-120) inside the two internal weapon bays. The F-35A is designed to carry up to 18,000 pounds on 10 weapon stations featuring four weapon stations inside two weapon bays, for maximum stealth capability, and an additional three weapon stations on each wing.



A March 29, 2012 "pit drop" marked the end of two weeks of testing nine different weapons combinations inside the F-35B test aircraft BF-3's two internal weapons bays. Weapons pit-drop testing collects data to measure stresses on the airframe and adjacent stores, ensures proper weapon and suspension equipment function, and validates the separation models for the munitions' ejection characteristics, including trajectories and velocities. Testing included inert versions of the GBU-12 Laser-Guided Bomb, the 1,000-pound GBU-32 Joint Direct Attack Munition and the AIM-120 missile. More weapons testing on the F-35B and F-35C carrier variant is ongoing at NAS Patuxent River. Current test events including pit drops, captive carry and instrumented weapons environmental flights, lead up to flight separation testing scheduled for later this year.



Marine Corps Maj. C. R. "Jimi" Cliff flew F-35B test aircraft BF-3 Dec. 19, 2011 with a 1,000-lb inert test GBU-32 in an open internal weapons bay for loads testing. Significant weapons testing for the F-35B and F-35C variants is scheduled for 2012, including fit checks, captive carriage, pit drop and aerial drop tests. The F-35B, the variant of the Joint Strike Fighter for the USMC, is capable of short take-offs and vertical landings.



On Feb. 22, 2012, Lockheed Martin test pilot Dan Levin flew F-35B test aircraft BF-2 with external weapons pylons for the first time. The test measured flying qualities with external pylons, inert AIM-9X Sidewinder air-to-air missiles and centerline 25 mm gun pod.

Outreach Education: A Key Element in National Defense

By Edward Petersen

The Problem

In the future, the U.S. may be engaged in wars for which the lessons learned in the past will not be adequate. We would be facing unknown and unseen enemies in struggles without rules of engagement, on new battlefields, using weapons not yet developed, and fighting with personnel trained in specialties, which have not yet evolved. Whether we call them CYBER Wars or Technological Conflicts, they would quickly be upon us and preparation must be made now.

Will we be attacked by another nation, an industrial corporation, or an individual working in the basement of his home? Will we be in a state of chaos and show no obvious infrastructure damage? Will there be incoming missiles and if so, will countermeasures be effective? Will weapons be delivered by individual subversives? Will there be soldiers storming our beaches or will the threat come from within? Will communications be disrupted beyond known failsafe back-ups?

The possibilities are limited only by the cunning of the enemy. Our best defense lies in a technologically proficient military and civilian workforce, trained to think outside the box and stay ahead of our adversaries.

The U.S. Department of Defense (DoD) is responsible for national defense. It must recruit, train, equip and support combat forces not only for conventional battlefields, but also for the technological battlefields where our survival is most threatened [i].

The Plan

1. **Situation:** The U.S. may not be able to maintain its position as the world's most powerful military force.

a. **Opposing Forces:** Several nations are making major efforts to raise their standards of living, their economic influence over world markets, and their military dominance both locally and globally. Their capabilities are increasing daily as they pressure their youth to study Science, Technology, Engineering, and Mathematics (STEM). These nations are expected to intensify their efforts, gain increased influence throughout the world, continue to pirate American technology, and shortly

challenge or exceed the technological, military, and economic leadership of the U.S. [ii].

b. **Friendly Forces:** The U.S. Government and its private sector contractors are working together to expand the talent pool from which they both must draw their future workforce. They must play a significant role in the motivation and education of today's students. This way they can ensure the skills and information most important to national defense will be available when needed. Public and private elementary and secondary schools throughout the country are expected to prepare their students for the careers of tomorrow. Few have the resources to remain current in the rapidly expanding area of technology. Few have a staff knowledgeable of the requirements for research and development. Most are so burdened with social objectives and extensive standardized testing they cannot provide the creative problem solving experiences their students will actually need.

c. **Attachments and Detachments:** Consortia such as the DoD Ordnance Technology Consortium (DOTC) and the Robotics Technology Consortium (RTC) have already formed partnerships ideally suited for a joint campaign to develop STEM literacy. Members are from the DoD, the individual services, academia, and traditional and non-traditional private sector contractors.

2. **Mission:** The defense sector can help ensure preparedness through education. The students of today will be the workforce of tomorrow. They must be educated accordingly. A fragmented effort is underway but must be accelerated in order to obtain significant results before the end of the decade [iii]. The U.S. must maintain its global leadership position in maintaining freedom, at home and throughout the world.

3. **Execution:** Mutually supporting efforts from the DoD's uniformed and civilian employees, private sector industry, and academia are needed to gain significant results with minimal waste. They do not have sufficient resources to fund education nor enough professionals to do the teaching. They can influence what is taught, participate in how it is taught, and provide role models and mentors for students.

4. Service Support: Support is enhanced by creativity. Effective use of classroom visits by scientists and engineers, teacher training workshops, activities which encourage inquiry and design education, utilization of technology, speaking the digital language [iv] of today's students, using competitions to challenge students, and showing students the advantages of engineering careers will all contribute to securing the objective.

5. Command and Signal: Know the target population and give them what they need. Speak to them in the language of the 21st century. Represent cutting edge technology and show the pathway to a successful future.

The Solution

The DOTC, headquartered at the Armaments Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ, has been very successful in providing meaningful outreach assistance to students, teachers, and their schools. The creation of the DOTC STEM Education Program Office enhanced the ability to provide the support further into the future by preparing their potential workforce a decade or more in advance.

A brief history of this program gives insight into the who, what, when, where and why and provides a model which other organizations may choose to follow.

When it was becoming apparent that not enough American students were selecting courses in the fields of Science, Technology, Engineering, and Mathematics to meet the needs of an increasing technological society, alarms began to sound.

Anticipated needs for the future research and development workforce could not be filled without significantly reversing this trend. The increasing reliance upon technology to provide support for the Warfighter makes any reduction in our technological capabilities a very serious matter. When viewed in conjunction with the rapidly expanding technical resources of our potential adversaries, the STEM competency problem impacts our national security.

Several attempts were made by the defense community to reach out to students and schools. Most of these programs lacked vision, coordination, and knowledge of the customer, namely students and teachers in elementary and secondary schools. Resources were being concentrated on students already committed to STEM careers instead of motivating additional students to join them. Flash in the pan activities like career fairs and special events lacked sustained impact and gave little motivation to the students to pursue STEM careers.

In many cases teachers were not involved in the process, even though they are the frontline Warfighters in our efforts to fight the technology war and win the hearts and minds of today's students. (The purpose here is not to criticize specific programs or individuals. It is rather to describe processes that are working and allow readers to form their own conclusions.)

When establishing an educational outreach program, the first step is to staff the office team. Select personnel who will be able to understand the needs of the schools and be able to communicate effectively with them. It is highly recommended that at least one member have previous experience employed by a school district in a teaching and administrative capacity. Experience working in research and development is necessary. Communication skills are needed and should include bilingual ability in areas where there may be large immigrant populations. All members must realize that the classroom teacher is the most important link in the chain, and without the enthusiastic participation of the teacher little if anything will be accomplished.

Next a careful assessment of the area of operations should be made. Determine what schools are in the area, what their needs are, and what demographics are present. Remember education is primarily a state issue. Establish contact with the State Department of Education. Obtaining their backing will make securing local administrative support much easier. The teacher may be the most important link in the chain but unless the district and building level administrators grant their approval, you will not be able to gain entry into the schools.

Establish credibility with the schools. Don't promise more than you can deliver. If you plan to work an area where the schools previously had some bad outreach experiences they may not believe you are really trying to help. You may have to support other districts and allow time for word of your successes to travel back to the original targets. Avoid wasting resources on any teacher or school not willingly participating.

Schools generally are faced with very tight budgets. Provide all assistance free of charge. Teacher training workshops are the best use of any funding you may have. Very few teachers actually use an inquiry and design method or experiential learning style of teaching. They will need assistance becoming comfortable with it, but it is essential in the engineering process. We have no need to create the next Jeopardy Champion. The engineers who created Watson already did that.

Memorization and regurgitation of facts is not as important to us as creativity. All teachers attending

workshops should receive the supplies they will need in their classroom for free. Supply free lunches and coffee break items for workshop participants. Reimburse the school district for the cost of the substitute teachers used to cover the classes while the regular teachers are getting trained. If training took place on a day when school was not in session pay participating teachers a stipend for attending.

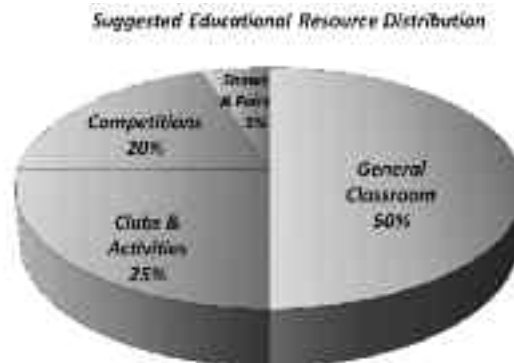
Above all, use only high quality trainers who will leave the workshop participants motivated and eager to try their newly learned skills. Continue support after the teacher returns to the classroom. Attendance at the workshops will also benefit the scientists and engineers who may be providing the sustainment function.

When considering what outreach assistance to give to schools, first determine their needs. Do not tell them what they need. They already know. Tell them what you can offer and let them tell you if they want it. Time is the most important commodity in the school. There are barely enough hours in the day for schools to meet minimum requirements. In order to make room for your program something else will have to be eliminated. Make sure what you offer will be worth the schools effort. Informal learning activities, which supplement the existing curriculum, and do not require additional standardized testing or curriculum revision, are the most desirable.

Selecting the programs you will make available to the schools will require some thought. Considerations should include where the activities can be used. Determine if they fit into general classroom use, co-curricular/activity use, or competitive team programs. Attracting additional students to STEM subjects generally starts by showing benefits and opportunities while the students are still in the general classroom.

Once the seed is planted in students previously not interested in STEM they will need opportunities to explore it further. Clubs and activities work well for this. When students become convinced STEM is the right choice, competitions will sharpen their skills and keep them motivated until they graduate.

Scientist and engineer volunteers make excellent mentors and coaches for school teams. Placing 50% of your resources into the general classroom, 25% into clubs and activities, and 20% into competitions will leave 5% to participate in shows and fairs. Even though large shows and fairs generally have little educational value because they lack sustainment potential, they can offer opportunities to publicize your efforts.



An extremely important part of any STEM outreach program is the need for mentoring and role models. Most students have no idea what an engineer does and have never actually spoken to one. The mentor puts a face on the term engineer and brings it to life. This is an advantage for the DoD because the large number of scientists and engineers at DoD labs and their industry partners provide a substantial resource pool of volunteers.



Mentoring future engineers

Before any inexperienced volunteer makes a classroom visit it is recommended they be given advice on school protocol and operating procedures. Two bits of advice all volunteers should receive are: 1) be yourself, be proud of what you do and what you have accomplished, and 2) remember you will be expected to answer one question. The question is: "Why do I have to learn this?" Chances are the volunteer will be the only one in the room with the answer. He or she may be the only one there who has worked in research and development and actually



Field trips are excellent motivators

used the math and the scientific theories the students are required to learn without understanding why.

Field trips to working laboratories and production facilities are very popular with students and teachers. It is good to be able to speak to an engineer in a classroom, but visiting that engineer where he or she works provides a life long memory for the student. Where the opportunity exists to provide internships or summer employment for students, make maximum use of those resources.

When working STEM Education Outreach, remember creativity is not just for the students. Utilize your own creativity to develop activities you can use with students. Sustaining student interest is an important concern.



Students examine a robot

The Controlled All Terrain Transport System (CATTSS) robotics concept, developed by the DOTC STEM Education Office and ARDEC professionals is a new way for students to have engineering experiences, freedom to be creative, and give teachers full control of their program goals, challenges, and structure. It can be

used throughout a student's middle and high school careers to provide opportunities for product redesign and improvement. The student learns virtual prototyping and how an idea can be transformed into a physical system.

Edward A. Petersen retired after a 32-year career in public education, which included earth and physical science teaching, along with science and general building administration. During his 25-year military career he had numerous assignments, including commander of a 155mm self-propelled howitzer battalion. He retired with the rank of colonel.

**Uncle Sam needs all of us
to enlist in the campaign
to win the STEM War.**

Will you answer the call?

**Will you be part of
America's Future?**

**For comment or
additional information contact:**

**DOTC STEM Education
Program Manager
edward.a.petersen@us.army.mil
(973) 724-7169**



References

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Lancer Achieves Close Air Support Capability

B-1B Lancers can now better find and strike moving targets in close air support (CAS) of ground troops.

During Operation Iraqi Freedom and Operation Enduring Freedom, it became clear that the B-1 bomber needed an additional capability to support CAS scenarios. That capability comes in the form of Laptop Targeting Pod Phase I.

The first phase of work integrated a targeting pod, but still required the weapons system operator to manually enter any coordinates derived from the targeting pod. This only allowed the pod to be useful on stationary targets.

Although Phase I allowed the B-1 to interface with the targeting pod, it proved to be a limited capability, as there was no hand-off of information from the pod back to the airplane. Although coordinates were derived from the pod, manually entering the data increased time and decreased the B-1's ability to strike a moving target.

The solution? LCTP Phase II. With the second phase, B-1 crews not only have the ability to complete the loop of the targeting pod, but also include the ability to drop laser targeted bombs from the B-1. Not only can they track and identify the targets on the ground, they can strike ground targets moving at low and high speeds.

LCTP Phase II's self-lasing capability allows the B-1 to track targets, constantly update its coordinates and employ GBU-54 Laser Joint Direct Attack Munition.

The B-1 bomber recently completed its 10,000th combat mission. The heavy bomber entered service with the USAF in June 1985. The milestone mission took off from a base in Southwest Asia and was flown in support of operations over Afghanistan.



The Laptop Controlled Targeting Pod Phase II upgrade to the B-1 gives the aircraft new capabilities.

“10,000 conventional combat missions for a relatively small fleet of 66 B-1s is a major milestone and a testament to the men and women who built, sustain and modernize the fleet,” said Rick Greenwell, Boeing B-1 program director.

The B-1 bomber has advanced over the years as it is modified for current needs. The aircraft began as a nuclear bomber and moved into a solely conventional role in the 1990s.

It carries the largest payload in the Air Force's long-range bomber fleet — during Operation Iraqi Freedom, it dropped 40 percent of all weapons while flying only five percent of the sorties. Today's B-1 can carry a mixed load of weapons in each of its three bays. ■



News Briefs

APKWS in the Fight

The Advanced Precision Kill Weapon System (APKWS) was recently approved for its first deployment to Afghanistan. APKWS was fired from a variety of distances from Marine AH-1W and UH-1Y helicopters in scenarios that are expected to be encountered in theater.

The U.S. Government's only program of record for the semi-active laser-guided 2.75-inch rocket, APKWS converts the Hydra 70mm unguided rocket into a precision guided munition through the addition of a mid-body guidance unit (WGU-59/B) developed by BAE Systems.



APKWS on AT-6C

The APKWS is a "plug and play," "point and shoot" weapon, and is fired like the unguided 2.75-inch rocket. The weapon is easily assembled by removing the warhead, attaching the guidance section to the rocket motor using existing threads, and then re-mounting the warhead to the guidance section. The weapon is shot with minimal instruction, as if it were an unguided rocket.

Also, the APKWS recently achieved a first shot success from a fixed-wing aircraft after it was fired



AH-1W fires APKWS

off a Hawker Beechcraft AT-6C from a range of three miles. The test highlighted the potential of APKWS as a low-cost weapon system for reconnaissance and attack aircraft throughout the world.

BAE Systems, which has been the APKWS prime contractor since 2006, also has demonstrated the APKWS capability on the OH-58D Kiowa Warrior. BAE Systems is upgrading the APKWS design to operate in the expanded flight envelopes of high-performance Navy and Air Force aircraft under contract for the Fixed-Wing APKWS Joint Capability Technology Demonstration (JCTD) program.

The Navy assumed acquisition executive oversight of the program in 2008 and has fully funded it for production. BAE Systems has achieved its monthly delivery rate and more than 400 production systems have been accepted into the Navy inventory under the designation WGU-59/B. ■

Soldiers Prep for Upgraded Howitzer

Soldiers from the 101st Airborne Division recently helped Picatinny Arsenal employees complete the second of three logistics phases required before the digitized M119A2 howitzer can be fielded to troops.

The upgraded digitized M119A2 will be equipped with a digital fire control system that integrates an inertial navigation system with glob-

al positioning system technology that will give the weapon the ability to self locate and accurately place rounds on target.

The M119A2 upgrade is a collaborative effort between Project Manager Towed Artillery Systems, or PM-TAS, Armament Research Development and Engineering Center (ARDEC), Tank Automotive and Armaments Command, Training and Doctrine Command and Combined Arms Support Command. PEO Ammunition is scheduled to begin fielding the digitized M119A2 in early 2013. ■

EM Railgun Under Test

Engineers have fired the Navy's first industry-built electromagnetic railgun (EM Railgun) prototype launcher at a test facility, commencing an evaluation that is an important intermediate step toward a future tactical weapon for ships, officials announced Feb. 28.

The firing at Naval Surface Warfare Center Dahlgren Division (NSWCDD) kicked off a two-month-long test series by the Office of Naval Research (ONR) to evaluate the first of two industry-built launchers. The tests will bring the Navy closer to a new naval gun system capable of extended ranges against surface, air and ground targets.

The EM Railgun launcher is a long-range weapon that fires projectiles using electricity instead of chemical propellants. Magnetic fields created by high electrical currents accelerate a sliding metal conductor, or armature, between two rails to launch projectiles at 4,500 mph to 5,600 mph.

The 32-megajoule prototype demonstrator, built by BAE Systems, arrived at NSWCDD in January. One megajoule of energy is equivalent to a 1-ton car being thrust at

100 mph. The prototype—which now looks more like a naval weapon compared to previous lab-style launchers—is the first of two industry-built launchers to be delivered to the Navy. General Atomics is building the second launcher. ONR previously relied upon laboratory-built systems to advance the technology.

The Navy's near-term goal is a 20- to 32-megajoule weapon that shoots a distance of 50 to 100 nautical miles. To achieve this, the Navy is moving ahead with the EM Railgun program's next phase: to develop thermal management systems for both the launcher and pulsed power



EM Railgun in test

to facilitate increased firing rates of up to 10 rounds per minute. Toward this end, BAE and General Atomics have been contracted to begin concept design of a next-generation thermally managed launcher. ■



Visit Booth #1902 during the NDIA Special Operations Forces Industry Conference (SOFIC), May 22-24, 2012 @ Tampa Convention Center, Tampa FL to receive PSA giveaways and to enter to win a complimentary registration for the PSA PEO Forum — June 12-13, 2012 and/or the PSA Golf Tournament on June 11.

CALENDAR OF EVENTS

PSA Golf Tournament

Date: June 11, 2012

Location: Cedar Points Golf Course—Naval Air Station Patuxent River, 22268 Cedar Point Rd, Patuxent River, MD 20670

Precision Strike PEO Forum

Date: June 12-13, 2012

Theme: *Integration and Interoperability... Getting More from Less*

Location: Naval Air Station Patuxent River, Patuxent River, MD

Precision Strike Technology Symposium

Date: Oct. 30 — Nov. 1, 2012

Theme: *Precision Strike's Role in Sustaining U.S. Global Leadership*

Location: JHU/APL – Kossiakoff Center, Laurel, MD

SECRET/US ONLY Classification Level

Sponsorships and exhibit opportunities available for all events—for more information email info@precisionstrike.org or visit our website: www.precisionstrike.org

PEO Summer Forum

Continued from page 1

Headquarters Air Mobility Command, Scott AFB, IL

He has also been a program manager on numerous weapon system development and production programs, including the F-22, E-3, Air Force One, KC-10, E-4, Wind Corrected Munitions Dispenser, Sensor Fused Weapon, Joint Standoff Weapon, Low Altitude Navigation & Targeting Infrared System for Night (LANTIRN), GBU-15 and the AGM-130.

Meanwhile, Lt Gen Tom McInerney, USAF (Ret), a well-respected Fox News military analyst,

is confirmed as the luncheon speaker on June 13. The event promises to be full of interesting presentations and discussions.

Key topics include: Navy Integration and Interoperability; Net Ready KPP Development Process; Enhancing Mission Capability through Innovative Integration and Interoperability Solutions; Propagating and Measuring Interoperability in the DCGS Enterprise; Weapons Integration Challenges on 5th Generation Fighters; Integration & Interoperability (I&I) Development, Test, and Training Facilities; Unmanned From the Carrier;

Interoperability Lessons Learned; C2 Interoperability and Integration at PMA-281; A Universal Gateway Architecture: Results from the 2011 ONR/PEO IWS/PEO C4I; Combat System/C2 Limited Test Experiment.

The conference is at the unclassified level. Please join our distinguished speakers as they showcase all the issues regarding precision weapons integration and interoperability.

For more information on the PEO Summer Forum, please visit our website (www.precisionstrike.org) or contact Dawn Campbell by email at dcampbell@precisionstrike.org or 703-247-2590. ■

PSTS-12 Program Highlights

PRECISION STRIKE TECHNOLOGY SYMPOSIUM (PSTS-12)

30 OCTOBER - 1 NOVEMBER 2012

Conducted at the SECRET/US ONLY Classification Level

The Johns Hopkins University Applied Physics Lab—Kossiakoff Center —Laurel, MD

Precision Strike's Role in Sustaining U.S. Global Leadership

Focus of Key Speakers

Smart Intelligence to Achieve U.S. Global National Objectives

Sustaining U.S. Global Leadership

Global SOF Needs—New Precision Strike Capabilities

Sea State in the Asia-Pacific Region—The Way Ahead

Kill Chain Challenges to Counter Naval Threats & Future of Air Sea Battle

Use of SO/LIC Forces in U.S. Global Engagement Strategies

Strategic Posture for Regional Deterrence

Two Hot-Topic Areas

Intelligence Session—U.S. Global Threats

Nuclear Panel

Numerous Riveting Technical Topics

- Current and Emerging Threat Assessment
- Meeting Precision Strike Challenges and Opportunities
- Weapons for Precision Strike in the Asia-Pacific Region
- Joint Operational Access Concept (JOAC)
- Technical Abstracts
- Joint Fires Support—What Works, What Doesn't, What's Needed Most
- Global Reachback for Targeting Support
- U.S. Army Unmanned Systems Technologies & Challenges
- OSD Land Warfare Munitions Perspective
- Arming 5th & 6th Generation Aircraft
- Cybersecurity & Information Assurance—How Secure is the Kill Chain
- Technology and National Security Policy—C4ISR Integration
- Hard Target Munition AoA
- Testing Against Hard & Deeply Buried Targets
- Conventional Prompt Strike
- Global Strike Requirements & Operations

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Precision Strike PEO Forum Wrap-up

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