The Precision Strike Digest

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"From Cruise Missiles Association to Precision Strike Association we have been dedicated to advancing the art and science of precision engagement concepts and technology for 20 years."

PSA
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.

Air Force Major Generals David Edgington & David Eidsaune to address PSA's Precision Strike Annual Review at Ft. Walton Beach, FL

The Precision Strike Association (PSA) proudly presents its Precision Strike Annual Review (PSAR-09) on 10-11 March 2009 at the Emerald Coast Conference Center. This Review combines the very popular Precision Strike Winter Roundtable and the Precision Strike Annual Programs Review of past years—renamed the Precision Strike Annual Review (PSAR).

This year's theme ***"New Administration—Future Strategy for Precision Engagement"*** will bring together senior leaders, warfighters, and experienced subject matter experts from DoD, industry, and international partners to discuss precision engagement's strategic direction.

Major General David Edgington—Chief of Staff, United States Joint Forces Command (USJFCOM)—will keynote this two-day review on opening day. General Edgington intends to share his vision for providing mission-ready joint-capable forces to meet the present and future operational needs of the joint force. He will focus on the challenges faced by joint precision engagement.

Major General Edgington

Major General Eidsaune

General Edgington is responsible for managing USJFCOM's warfighting initiatives and providing executive staff guidance on day-to-day matters. Prior to his current position, General Edgington served briefly as USJFCOM's director of capability development after completing a one year deployment to Baghdad, Iraq as Director, Air Component Coordination Element (ACCE). In addition, he served in numerous staff positions on the Air Staff and the Joint Staff. Further, General Edgington served as Special Assistant to the Supreme Allied Commander Europe (SACEUR), where he was the air power adviser during NATO's Operation Allied Force in Kosovo.

PSA's host for PSAR-09 is Major General David Eidsaune—Commander, Air Armament Center and Air Force Program Executive Officer for Weapons at Eglin AFB. General Eidsaune invites us to beautiful

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Chairman's Column

First, let me thank everyone involved in the planning and execution of our most recent Precision Strike Technology Symposium, in particular Ginny Sniegon and all of the Programs Committee, John Walter and the supporting staff at APL, and Dawn Campbell–the PSA Executive Director. But most of all, I want to thank those of you who attended. I believe PSTS-08 once again raised the bar in meeting our PSA vision, which is to foster communication to better deliver precision strike capability to our forces in the field. Thank you very much for spending your symposium dollars with your Precision Strike Association!

As you know, we have planned a much different configuration of events this year. We did not hold our traditional Winter Roundtable in January. PSA will host the Precision Strike Annual Review (PSAR) next month in Ft Walton Beach, FL instead of our usual Crystal City, VA location. We are excited about the opportunity to bring an event that focuses on precision engagement operations concepts and the Kill Chain close to the USAF Air Armament Center as well as the many other service and joint commands located in the southeast U.S. You can find more about the PSAR agenda and location as well as registration information on page 15 of this issue of the Precision Strike Digest.

Precision engagement capability challenges get bigger and bolder everyday as our forces finds themselves in new and extremely challenging engagements with our enemies around the world. There's never been a better time to be a part of the precision strike community because I'm convinced the government and industry team is having profound affect on the outcomes of battles everyday. PSA greatly values your collective expertise and looks forward to providing new solutions to the warfighters.

Bill Dalecky

Bill Dalecky
Chairman of the Board
Precision Strike Association

Annual Review,

Continued from page 1

Fort Walton Beach to get away from the pressures of Washington, D.C. for a couple of days of professional exchange. General Eidsaune's intent is for PSAR-09 to showcase select precision strike requirements and systems in a relaxed atmosphere as DoD continues to seek efficiencies in the current fiscal environment.

General Eidsaune is scheduled to present opening remarks while highlighting the latest in Air Force precision strike systems.

Please join our terrific speakers from across the joint spectrum for this unique opportunity. Note page 15 for focus areas that will be addressed during PSAR-09. We look forward to seeing you at Fort Walton Beach! ■

PSTS 2008 Wrapup

The Precision Strike Association (PSA) held its 18th Annual Precision Strike Technology Symposium October 28-30, 2008, in the Kossiakoff Conference Center at the Johns Hopkins University Applied Physics Laboratory (JHU/APL) located in Laurel, MD.

Under the able leadership of Ginny Sniegon (PSA Programs Chair), Dr. John Walter, George McVeigh and Harvey Dahljelm tri-chaired this very successful three-day SECRET/NOFORN symposium by focusing on the theme *Compressing and Integrating the Kill Chain*.

PSTS-08 provided a stimulating venue for discussing Joint and Coalition Precision Strike Technologies to improve the kill chain. Current and emerging kill chain technologies, concepts, capabilities, and processes for both near and future planning and operations dominated the discussion.

Dr. Richard T. Roca

Dr. Richard T. Roca, Director of JHU/APL, welcomed the precision strike community to PSTS-08.

He said that "over the past decades, the precision strike community has become proficient in numerous areas. We are proficient in detecting fixed targets. We are proficient at autonomously flying weapons for very long distances. We are proficient at precisely navigating weapons to a particular point in space. We have the worlds most advanced strike platforms."

"We must be persistent in our surveillance; we must be robust in our command, control, and communications capabilities; and we must be able to respond quickly when the targets do emerge. We must compress and integrate the kill chain. This is the challenge in front of us. This is where we must focus our efforts," stated Dr. Roca.

Rear Admiral William E. Shannon, III, USN

USN Rear Admiral William E. Shannon, III, the US Navy Program Executive Officer for Unmanned Aviation and Strike Weapons (PEO (U&W)), kicked off PSTS 08 with a comprehensive rundown of Navy strike weapons. More importantly, RADM Shannon provided the Navy's vision for how the PEO (U&W) intends to meet the COCOMs requirement for precision engagement capability to meet threats into the future at all points in the spectrum of conflict.

Then, the U.S. Joint Forces Command's Deputy Director of Intelligence (J2), **Colonel Skip Krakie, USAF**, presented a very informative Intelligence briefing on the Emerging Threat. Due to sensitivity of briefing material, highlights cannot be provided.

COL Skip Krakie, USAF

Next, **Dr. John Wilcox**, ADUSD for Precision Engagement, Office of the DUSD for Advanced Systems & Concepts, DDR&E, briefed the Small Weapons Technology Roadmap and Rapid Prototyping for Accelerated Weapons Deployment. He noted that DoD is experiencing a rapid increase in the employment of small Unmanned Aerial Systems (UASs) for use in overwatch missions—especially in urban areas. The state of the art for small weapons technology has progressed rapidly and a new class of 5-15 pound weapons with great accuracy is emerging. These weapons provide a focused lethality effect for reduced potential of collateral damage. Some of these weapons we are looking at include: the SPIKE missile, Switchblade and Guided Mortar Rounds. Small UASs with small, accurate weapons will bring an improved operational outcome for many of the tactical units involved in today's conflicts.

Dr. John Wilcox

Further, Dr. Wilcox stated that the Joint Capabilities Technology Demonstration (JCTD) Program is becoming a model for transition of emerging technologies through rapid and competitive prototyping efforts. JCTDs, like the Hard Target Void Sensing Fuse (HTVS) program, are competitively prototyping to rapidly deliver a capability to the operational warfighting units. These prototyping efforts result in better weapons requirement definition, shortened engineering and manufacturing development (EMD) and involve the warfighter early in the technology development phase.

Following the morning break, **Colonel Eric Thomton, USAF**, Deputy Director for Targeting Support, Directorate for Intelligence, The Joint Staff, provided an overview of the different technologies, systems and applications currently available and fielded to the joint targeting enterprise to move information (e.g. descrip-


Col Eric Thomton, USAF

tion, geolocation, significance…) through the joint targeting cycle's six iterative steps from Commander's Objectives to Assessment, as seen through a notional intelligence specialist at a Combatant Command production center. Col. Thomton highlighted the foundational data resident in the Modernized Integrated Database and how it is updated and its data shared with specialized systems such as the Fast Assessment Tool for Collateral Damage Estimation and the Joint Weaponeering System using the Joint Targeting Toolbox as an integrator.

Further, Col. Thomton described the products the systems/applications produced at each step towards building electronic target folders and approved target lists, and where/how data flows are machine-machine and where they require manpower to move it. He then laid out several challenges needed to fully integrate these systems and applications, but concluded by recapping the enormous improvements the DoD has made in ten years in this area.

The morning session concluded with a presentation by **USN Captain Steve Kochman**, PMA-234, who addressed recent developments in electronic attack which are increasing precision and capacity. Captain Kochman discussed the new jammer footprint for the ALQ-99 and the value of beam control that can be used to accurately steer narrow jammer beams. Further, he described how multiple jamming assignments can be achieved from a single array. He also briefly talked about the development and testing of electronic attack payload technologies. In closing, Captain Kochman noted that the next generation jammer is the next "big thing" for electronic attack.


CAPT Steve Kochman, USN

Lt. Gen. Thomas G. McInerney, USAF (Ret), a Fox News military analyst, spoke at lunch. He captivated the precision strike community with his sober talk about the *Global War Against Radical Islam*. He asserted that three of the eight "Webs of Terror" nations—Afghanistan, Iraq, and Libya—are now changing; Iran is current King of Terror; and Syria, Saudi Arabia, Pakistan and North Korea are enablers. McInerney believes that the West must hold moderate Islam accountable for Radical Islam actions. He presented highlights of why Iran cannot develop nuclear weapons by focusing on the unacceptability of the nuclear threat to our national security and asserted that if we wait too long we will have to use U.S. air power to attack their nuclear sites.


Lt Gen Thomas G. McInerney, USAF (Ret)

He believes that the Iraq-U.S. led coalition has won in Iraq and reiterated that the conditions on the ground determine the pace of the draw down. He said that the two nations must work together to bring greater stability to Iraq and the region—there is hope in the eyes of young Iraqis for the first time in many years. Further, McInerney briefly highlighted strategies in which the coalition must engage to defeat Radical Islam. McInerney asserted that the U.S.'s New Administration must utilize General Petraeus' leadership in helping to stabilize Pakistan's new government.

Additionally, McInerney stated that the U.S. does not have a deterrent strategy against nuclear terrorism and must get one as soon as possible. Also, he believes that Israelis and Palestinians can solve the West Bank problem only if Tehran, Damascus, and Riyadh want it solved. The General's luncheon remarks concluded with a very lively Q&A session. McInerney thanked the precision strike community for all that it is doing to protect America and the Free World.


Greg Hulcher

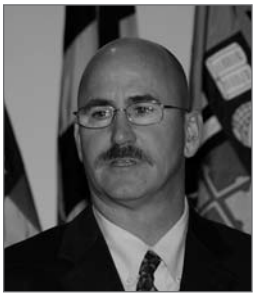
In the context of the full range of strategic offense and defense capabilities with their C2 and ISR enablers, **Greg Hulcher**, Deputy Director, Strategic Warfare, OUSD (AT&L) provided an overview of DoD's Conventional Prompt Global Strike program, with emphasis on the technical challenges to be addressed ahead of full demonstrations in FY11. This capability development brings together virtually all aspects of precision strike at new levels, ranging from strategic and real-time ISR, national command and control, high basing and execution reliability, and predictable kinetic effects on target. The national team will address these challenges first with experimentation and systems integration, followed by full mission demonstrations of a potentially deployable and operational capability.

Then, **Adam Timm** (a member of the Joint Persistent Surveillance Integration Office (JPSIO), National Geospatial-Intelligence Agency) provided an insightful presentation that highlighted the JPSIO's current efforts in the area of persistent surveillance support to targeting. Timm addressed the objectives of persistent surveillance

highlighting the concept of capturing on-going activities of a subject; identifying additional actors supporting the subject; identifying the network supporting the subject; and determining future actions. Persistent surveillance, unlike feature-based geospatial-intelligence (GEO-INT) focuses its capability on capturing activities as they occur, vice analyzing a static image for past activity.

Adam Timm

Timm underscored the critical technologies required for persistent surveillance and defined the operations-intelligence model associated with their concept. He also pointed out the need for persistent surveillance is particularly suited for the current irregular warfare our nation finds itself engaged in throughout Iraq and Afghanistan.



Keith Davis

Next, **Keith Davis** (a former Marine with over 20 years service in the imagery intelligence field who is currently a project manager for Integrity Applications Inc. (IAI), Carlsbad, CA) provided a succinct overview of IAI's efforts to develop software tools designed to streamline the target coordinate mensuration process. The ability of our forces to rapidly complete the kill-chain process against time sensitive targets frequently relies on the ability of the targeting cell to provide GPS quality coordinates to the 'shooter.' This process often takes too long and the opportunity to engage a fleeting target is lost. The Precision Mensuration Manager (PMM) tool addresses this issue and is another tool in the Joint Commander's kit in reducing the kill chain's timeline. Integrated directly into the Joint Automated Deep Operations Coordination System (JADOCS), PMM aids in analyst workload management, automatic notification of tasking, activity completion tracking via time-stamp and rapid notification of task completion via the JADOCS display. PMM accelerates the mensuration process by reducing delays in analyst administrative functions while providing targeting cell managers increased visibility on the status of the mensuration process.

CDR Patrick W. Smith, USN and Douglas M. Larratt

USN Commander **Patrick W. Smith**, PEO(U/W), PMA-242, and **Douglas M. Larratt**, Manager, Strike Weapons Business Development, ATK Advanced Weapons, concluded the presentations on PSTS-08's first day, offering the latest information on the Advanced Anti-Radiation Guided Missile (AARGM), a lethal and precise weapon for attacking enemy air defenses. AARGM is currently completing the final year of System Development and Demonstration and is scheduled to enter Operational Evaluation in FY 2009 to demonstrate the military utility of the multi-spectral, multi-sensor capabilities of this upgrade to the AGM-88 missile. Ultimately, this program will directly enhance the operational commander's ability to conduct Suppression of Enemy Air Defenses (SEAD) missions.

The second day of PSTS-08 was kicked off by the JC2NEW Joint Test Director, **USAF Colonel Steven J. Walker**, who provided excellent insights on kill chain management with respect to a three dimensional construct consisting of time (e.g. target and weapon timelines), function (e.g. C2 processes), and environment (e.g. players, non-players, actions, infrastructure that affect the decisions and execution of the event). Col. Walker explained that the conventional execution of a dynamic targeting kill chain implies that once a weapon is released, the warfighter cannot modify or re-task the weapon in-flight.

Col Steven J. Walker, USAF

He said that net-enabled weapons bring enhanced capabilities that change this paradigm. These include the ability to refine the target aim point after launch, change the weapon's aim point to a new target location or a higher priority target, re-task the weapon in a post launch environment, and optimize employment against dynamic targets in all conditions by taking advantage of a variety of targeting sources and sensors.

Col. Walker pointed out that network centric warfare is identified as a key enabler for 21st century warfighting, and net-enabled weapons will play a vital role. He went on to say that net-enabled weapons will provide commanders a window of opportunity to modify or re-task the weapon, depending on the weapon's available flight time and required C2 activities. The JC2NEW Joint Test is focused on the required C2 activities once a target is validated and authorized to be attacked. Colonel Walker posited that effective kill chain management — in the context of time, function, and environment — is the keystone of net-enabled weapons potential as a force multiplier.

Jeffery A. Lyon, Falcon Eye Lead Systems Engineer, Mustang Technology Group, spoke next about the Falcon Eye Maritime Interdiction Seeker. Falcon Eye supports launch and leave operations in favorable or adverse weather conditions. Mustang Technology Group has successfully completed the initial phase of the Falcon Eye program, which is sponsored by the Air Force Research Laboratory Research Weapons Directorate (AFRL/RW). Mr. Lyon explained that during Falcon Eye phase 1, the seeker's form factored Radio Frequency (RF) electronics and antenna subassemblies were developed and tested in laboratory and captive flight environments. He stated that collected flight test data was used to develop baseline target acquisition and tracking algorithms. Currently underway, Falcon Eye phase 2 includes the development of the seeker's Digital Electronics subassembly and real-time signal processing. Subassemblies of the Falcon Eye seeker are being integrated and flight tested to achieve a technical readiness level (TRL) of 6.

Jeffery A. Lyon

Lt Gen David A. Deptula, USAF

Lieutenant General David A. Deptula, USAF, Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance was the keynote speaker on day two of PSTS. Lt Gen Deptula brings a great deal of experience to the issue of ISR in the Kill Chain. He has extensive operational experience as an F-15C pilot and commander at all levels. Additionally, Lt Gen Deptula was intimately involved with the operational planning and execution of theater air operations going back to Desert Shield and Desert Storm. He is a recognized expert who brings a great deal of intellectual rigor to what is often an arcane topic. Lt Gen Deptula reinforced the need to look at the Kill Chain in a comprehensive manner with an eye toward optimizing the entire set of processes. He went on to say that while progress has been made in creating a better joint understanding of ISR, there is still organizational progress that needs to be made to make the system responsive to the needs of the warfighter. Gen Deptula's presentation was truly one of the event highlights.

Dr. Stanley Young, a fusion technologies consultant with Overwatch, Textron Systems, Austin, TX, described an approach to compressing the kill chain. He recommended new sensor tasking based on fusion of data from sensors monitoring mission execution and other sources. This fusion process provides an automated, or semi-automated, retasking of sensors as necessary to keep up with the current situation observed during mission execution and, consequently, reducing the lag between a recognized need for new sensor data and the availability of relevant sensor data. According to Dr. Young, this retasking is accomplished by identifying sensor gaps with respect to relevant times and locations. The monitoring system is trained using previously collected data for actual missions or predicted activity for a given mission. As the system execution is monitored, an adaptive sensor planner fuses the available sensor data with other reports to create potentially new sensor tasking that keeps up with the current mission execution scenario.

Dr. Stanley Young

The next presenter, **USAF Colonel West Anderson**, Vice Commander of the 2nd Bomb Wing, briefed *The B-52 & Long Range Strike Beyond 2010*. He opened the presentation by discussing the nuclear and conventional nature of the B-52, referred to as "dual-role" capabilities, and the payload capacities for each of these roles. In addition, he described what type of missions the B-52 is tasked to perform for the different Combatant Commands, as well as a new role in Homeland Defense.

Col E. West Anderson, USAF

Col. Anderson discussed the incredible precision capability that today's B-52 has with its arsenal of precision guided weapons, along with providing insight into the emerging precision combat capabilities of the B-52 with the Advanced Targeting Pods (Lightning and Sniper pods), in both the counter-land and counter-marine missions.

Col. Anderson believes that while the 21st century security environment has drastically changed, long-range airpower remains critical to achieving our national security and deterrence objectives. He said U.S. strategic deterrence has suffered over the last several years due to lack of long-range strike force structure, exercises, deployments and forward operating bases. Noting that while today's long-range strike capabilities are impressive, U.S. long-range strike has dramatically eroded over the last 20 years to a point where further reduction in the B-1, B-2, or B-52 fleet would place into doubt our ability to meet existing war plans. Col. Anderson concluded his presentation by focusing on the nature of strategic deterrence


Col Karl Reinhard, USA


Kevin Woods


Jeffrey A. Thomas


Dr. Robert L. Hastie Jr.

and concepts—how long-range strike aircraft should be employed beyond 2010.

Colonel Karl Reinhard, USA, Executive Officer to the Director, Joint IED Defeat Organization, then offered PSTS-08 attendees an update on his organization's efforts to diminish the Improvised Explosive Device (IED) threat.

Kevin Woods from the Joint Advanced Warfighting Division, Institute for Defense Analyses, presented a very informative update of last year's presentation on the Iraqi Perspectives Project (IPP). Woods provided additional insights and highlighted implications for future intelligence activities, information operations, high-value targeting, and operational warfighting concepts. The overall objectives of this project were to learn the right lessons of OIF, to inform near term contingency planning, and to support ongoing transformation activities. He will now transition his unique research into the Conflict Records Research Center.

The Director of DTRA's Test Support Division, **Jeff Thomas**, briefed on the Future of Hard Target Defeat. He noted that the number of countries/non-state entities with underground facilities (UGF) programs is growing and the number of UGFs with extensive overburdens increases annually. DTRA has initiated a Target Assessment Technologies program that provides development, integration, and application of technologies to find, characterize, and assess hard and deeply buried targets and WMD facilities for the COCOMs and the Intelligence community. Also, scaled testing and modeling and simulation are potential growth areas.

Dr. Robert L. Hastie, Jr., Chief, Hard Target Defeat Branch, DTRA, then provided an energetic discussion on defeating weapons of mass destruction located in hard and deeply buried complexes. DTRA, in partnership with the USAF, is conducting a technology demonstration program to evaluate advanced weapon defeat capabilities and employment tactics to defeat hard and deeply buried targets. Dr. Hastie's presentation provided an overview of weapons technology development, analyses, and testing to date, as well as a summary of future activities.


Donald F. Walker

During the second day's concluding session, **Donald Walker**, Principal Analyst EO Team, Center for Countermeasures, Operational T&E, OSD, White Sands Missile Range, presented a very beneficial briefing on *Assessments of Advanced Weapons*. For nearly 30 years, Walker has conducted countermeasure (CM) tests and evaluations of precision guided weapons (PGW) systems at the Center that provides DoD and the Warfighter with CM-hardened PGW and EO/IR sensors and program support throughout a system's life cycle.

In addition to discussing the assessments of weapons testing, Walker presented several video clips showing the development of foreign multispectral obscurants and smokes. Further, he presented findings from a recent operational exercise that provided the Warfighter with training against counter-countermeasure materials that will occur in the hostile battlefields of the future.

In summary, Walker stated that the Center provides all DoD agencies, program managers and weapons developers an independent, cost-effective assessment of their advanced weapons and stated that our Warfighters are obtaining CM-hardened systems and the CM knowledge that aids them in the completion of their missions.


John Fletcher

John Fletcher, a Senior Professional Staff analyst for the Applied Physics Laboratory's C2 Group in the Global Engagement Department, provided an update on the Navy's Maritime Headquarters with Maritime Operations Center (MHQ w/MOC) effort. John is supporting the Commander, Second Fleet's MHQ w/MOC Project Team focused on the force applications/ fires warfighter functional area. The CNO's vision is to establish a global network of MHQ w/MOC to deliver global maritime capabilities throughout the full range of military operations. MHQ w/MOC will enhance the Navy's capability to command forces at the operational level of command with consistency via headquarters manned by individuals fully qualified in joint operational level of command staff processes.

He explained Navy Fires has traditionally focused on tactical execution of strike. Navy operational strike processes rarely interfaced within Navy "lifelines," and Joint Force Maritime Component Commander (JFMCC) tactics, techniques and procedures remain in draft form. The MHQ w/MOC Force Application/Fires capacity, capability and consistency effort is expanding the Navy's traditional application of fires to operational planning for engagement and maneuver for kinetic/non-kinetic and lethal/non-lethal operations across the range of military operations within joint, interagency, combined organizations. Current efforts are focused on capturing planning and manning best practices and developing a dynamic model and simulation capability focused on the deliberate and dynamic targeting cycle for maritime fires. Future efforts of the maritime fires team will focus on instrumenting force applications workflow to enhance operational planning, training and future quantifiable accreditation.


Dr. Michael E. Vlahos

In leading off the final day of PSTS-08, **Dr. Michael E. Vlahos**, Fellow, National Security Studies, JHU/APL, said what was once known affectionately as "close air support" has become a full-service, customized profession. He was able to observe on CCSG7, during its support of OEF, a stunning display of the new personalized precision fires-personalized because quite small groups of troops on the ground could now craft and customize their response to hostile fire or even attacks.

Part of this amazing capability is the level of communication between pilots and the joint tactical air controllers on the ground. Together they can now share the same picture of what is happening, and even interact to shape and describe the target zone.

Among the biggest share-providers of sorties while in-theater, CCSG7 worked to make sure that its interactive shaping of the target field would NOT include civilians. It is to its credit that it supported OEF without any "collateral damage." As the Strike Group Commander said proudly at his change of command, "the most important bombs may have been the ones we didn't drop." But the fact remains that right before their arrival a big wedding party was hit, with scores of toddler deaths. In the first six months of 2008, the Coalition killed from the air more civilians than the Taliban. The difficulty in the new personalized precision fires paradigm is this: if it avoids civilian casualties, and protects small coalition patrols, it is doing that, and that is good. But how is it actually helping the war effort? If it goes further, however tactically effective, it risks inflaming the very people it is trying to help, and assisting the enemy's recruitment.

Bottomline: Just as Nirvana is a select experience, so our magnificent capability to provide personalized precision fires is not for every combat context. It is a superb tool in the box, but it is not always the solution, believes Vlahos.


Ronald Flatley

Ronald Flatley, Program Manager, Directed Energy Technology Office, NSWC, Dahlgren, VA, discussed a very interesting non-kinetic strike capability called Project Guillotine. This project would provide a non-kinetic, offensive, information operations capability against enemy computing infrastructure, integrated air defense systems, mobile radars, and communications gateways. This technology has reached technical maturity (TRL 6/7), has been positively endorsed as a part of a military utility assessment, and is currently an unfunded POM 10 issue.


Walter E. Bowen

Walter E. Bowen, Assistant Group Supervisor, JHU/APL described a study that investigated adding a maritime interdiction capability to the Tomahawk Weapon System (TWS). Bowen and his team took a very detailed systems-of-systems look at the problem, addressing targeting needs and capabilities as well as weapon needs and capabilities. The study resulted in specific, technical recommendations regarding a new seeker and an improved weapon data link for the Tomahawk missile.


Col Jeffrey Eggers, USAF

Next, the USAF's Director of UAS Transformation, **Colonel Jeffery Eggers, USAF**, briefed on the MQ-9 Reaper's capabilities. The MQ-1 Predator and the larger and more lethal Reaper have helped ground forces in both Iraq and Afghanistan track down insurgents and assess battle damage. Col. Eggers addressed target coordination and focused on the laser rangefinder designator for guiding weapons and the tactical datalink. Further, he discussed current global MQ-1/9 operations for the joint force.

USN Captain Martin W. Deppe, PM, Navy Unmanned Combat Air System, PMA-268, discussed the requirements and expected capabilities of the Navy's Unmanned Combat Air System (UCAS). Captain Deppe was care-

CAPT Martin W. Deppe, USN

ful to point out that Navy UCAS is not an acquisition program, but rather a carrier demonstration program designed to prove the viability of a carrier-based tailless UCAS. He stressed three important points in his presentation. First, a Navy UCAS will require a combination of unprecedented system attributes to meet emerging challenges to Naval airborne power projection, including ultra-long refueled endurance; deep weapon magazine internal to the air vehicle; broadband, all- aspect stealth; and long organic range. Second, analysis has shown that a tailless UCAS is an attractive solution. And, third, the UCAS acquisition framework supports initial fielding in the 2025 timeframe.

William R. Smith

William R. Smith, Director, Fuze & Precision Armaments Technology, U.S. Army ARDEC, Picatinny, NJ, provided a very complete and interesting discussion of recent Army Gun-Fired Precision Munition activity, specifically where the Army is, where they are going, and what is yet to be done. The first of these is an extremely accurate mid-range munition that will provide a dual mode Beyond Line of Sight (BLOS) capability for the Future Mounted Combat System (FCS MCS) and will also be compatible with the M1A2 Abrams System Enhancement Package (SEP) Tank for potential integration.

Smith then addressed EXCALIBUR, a precision guided, extended range 155mm High Explosive cannon ammunition, currently in use in Iraq. It features an all weather, day/night, fire & forget capability, optimized for urban/complex terrain. It uses an GPS-Inertial Navigation System guidance w/anti-jam technology and has Achieved 10 meter CEP Accuracy. Development for its successor, the EXCALIBUR 1B, being developed jointly by the Raytheon Missile Systems, and Alliant Tech Systems, will provide greater reliability, improved accuracy, at a reduced unit price.

One of the most interesting uses of GPS technology for munition use is the Precision Guidance kit which provides an "affordable", near precision capability for the older, "dumb artillery round" stockpile by means of a GPS fuze that fits in standard 155mm high explosive artillery projectile fuze wells. It provides both proximity & point detonating fuzing at a significantly reduced cost. Smith concluded by saying that "accelerated development and fielding of these new weapons systems were made possible through predictive analyses techniques".

Robert K. Finlayson III

Robert K. Finlayson, III, Technical Director for Joint Surface Warfare, JHU/APL, provided a much appreciated, honest discussion of the challenges associated with net-enabled weapons. His presentation focused on the Joint Surface Warfare (JSuW) Joint Capability Technology Demonstration (JCTD) and the programmatic and engineering challenges posed by the JCTD. The JCTD is a two-phase flight demonstration that comprises five platforms: F/A-18E/F, Joint Standoff Weapon (JSOW C-1), Harpoon Block III, P-3C Littoral Surveillance Radar System (LSRS), and Joint Surveillance and Target Attack Radar System (JSTARS). The concept consists of weapon launch by the F/A-18 with in-flight target updates passed by the surveillance assets to the weapon via the Link-16 J11 message set. The primary challenges include ensuring interoperability amongst platforms and evolving operational concepts and the associated tactics, techniques, and procedures to take full advantage of the potential of net-enabled weapons.

PANEL-USE OF PRECISION MUNITIONS IN IRREGULAR WARFARE:
Lt Col Joe Horab, USA, CAPT Daniel Dixon, USN,
Col Eric Smith, USMC, Col Art McGettrick, USAF,
Col David Sutherland, USA

A highlight of PSTS-08 was the Joint Staff's Panel on Use of Precision Munitions in Irregular Warfare. Moderated by **LTC Joe Horab, USA**, Chief, Kinetic Weapons Branch, Force Application Engagement Div. (J-8), the panel provided an opportunity for the audience to receive feedback from officers who have led Soldiers, Sailors, Airmen and Marines in combat in both Operation Iraqi Freedom and Operation Enduring Freedom.

The panelists Colonel David Sutherland, USA, Colonel Art McGettrick, USAF, Colonel Eric Smith, USMC, and

Captain Daniel Dixon, USN provided their insights on preparing for and executing combat missions under conditions of uncertainty, poor weather, at night in both urban environments and challenging terrain. Their presentations demonstrated the value of precision munitions through a reduction in delegation of approval authority by limiting collateral damage and identifying the stringent conditions weapons release authorities must be granted. ■

PSA would like to thank the following Corporations for Sponsoring PSTS-08

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Northrop Grumman
Raytheon Company

We are pleased to note that PSTS-08 marked the 6th consecutive year that U.S. Naval Academy Middies participated in the annual event. Nearly 50 Middies and three instructors from the Weapons and Systems Engineering Department attended (a few are shown above). Many commented that PSTS-08 was a great learning experience and stated that they gained valuable insight about precision strike technologies and concepts. As the next generation of military leaders, this was a terrific opportunity to become familiar with precision strike systems that they will be operating after they graduate and become commissioned officers.

ATK exhibit

PCS Piezotronics exhibit

Marotta Controls exhibit

Integrated Guidance Systems, LLC exhibit

Whitney, Bradley & Brown exhibit

The Boeing Company exhibit

Lockheed Martin exhibit

ITT exhibit

The Office of the Deputy Undersecretary of Defense Advanced Systems and Concepts - Joint Capability Technology Demonstration (JCTD) Program exhibit

Precision Strike Association honors the Satellite Shootdown Team "Operation Burnt Frost" in Gold Award Ceremony

In recognition of outstanding contributions to furthering the operational concept of precision engagement and to creatively adapting existing precision strike systems to a highly unique defensive mission, the Precision Strike Association is honored to award its prestigious Gold Medal Award to:

- Lieutenant General Trey Obering USAF, Missile Defense Agency
- Rear Admiral Brad Hicks USN, The AEGIS BMD Program Office
- Captain Ronald Boxall, USN representing the Officers and Crew of USS LAKE ERIE(CG-70)
- Conrad Grant representing John Hopkins University Applied Physics Laboratory
- Richard Hussey representing Raytheon Missiles Systems Company —Standard Missile Team
- Robert Waite representing Lockheed Martin Company— AEGIS BMD Team

This Gold Medal award recognizes both leadership and technical accomplishment, under significant pressure of time that resulted in defeat of a significant global threat using highly-modified precision strike system assets. The Satellite Shootdown Team, under the strong and competent leadership of General Obering, made significant contributions which advanced our national security by direct application of precision strike techniques and equipment, and by so doing prevented an errant space satellite from dispersing a highly toxic substance into earth's atmosphere.

The Operation Burnt Frost activities began in late 2007 when the orbit of satellite NRO Launch 21 decayed and the satellite became a defined threat. Within a short period of eight weeks, an existing AEGIS BMD Standard Missile weapon was significantly modified and loaded onto CG-70 USS Lake Erie. This unique missile defense weapon was launched on 20 February 2008.

The Navy and industry team operating under the leadership of the Missile Defense Agency completed its work successfully and on schedule, and the threat was eliminated mere minutes after CG-70 launched the precision weapon. The actions of the men and women of the US Missile Defense Agency and its military and aerospace teammates are of strategic import, and raise the bar for excellence in precision engagement.. ■

USS LAKE ERIE CREW: CAPT Ronald A. Boxall—Commanding Officer, LT Christa Almonte—Operations Officer, Bill Dalecky—PSA Chairman, LT Thomas A. Shapiro—Fire Control Officer, Scott Large—NRO Director, FC2 Robert Polt—SPY Technician and FC2 Andrew Jackson—Missile System Supervisor

AWARD RECIPIENTS: Scott Large—NRO Director, Rear Admiral Brad Hicks—The AEGIS BMD Program Office, Conrad Grant—JHU/APL, Maj Gen Chris Anzalone, USAF—Missile Defense Agency, Richard Hussey—Raytheon Missiles Systems Company, Captain Ronald Boxall, USN—USS LAKE ERIE (CG-70), Robert Waite—Lockheed Martin Company—AEGIS BMD Team

BMD Team Intercepts Target in Most Complex Test to Date

Boeing, working with industry teammates and the U.S. Missile Defense Agency, on Dec. 5, 2008, completed a successful intercept of a target warhead in the most challenging test to date of the USA's only long-range ballistic missile defense system.

"This test demonstrated that the Ground-based Midcourse Defense (GMD) system can defeat a long-range ballistic missile target," said Scott Fancher, vice president and general manager of Boeing Missile Defense Systems. "This intercept is further proof that GMD can provide our nation with an effective defense against the threat of long-range ballistic missiles."

The GMD system test began when a long-range ballistic missile target lifted off from the Kodiak Launch Complex in Alaska. Military operators launched an interceptor from Vandenberg AFB, CA to intercept the threat-representative target.

As the interceptor flew toward the target, it received target data updates from the GMD fire control system, which collected and combined data from four different sensors, the most ever for an intercept test. The sensors were the Aegis Long Range Surveillance and Track system in the Pacific; the AN/TPY-2 radar temporarily located in Juneau, AK; the Upgraded Early Warning Radar at Beale AFB, CA; and the Sea-Based X-Band Radar (SBX) in the Pacific.

After flying into space, the interceptor released its exoatmospheric kill vehicle, which tracked, intercepted and destroyed the target warhead. This end-to-end test of the GMD system was the most realistic and comprehensive to date.

"Data gathered from multiple sensors gave us a clearer picture of the incoming threat, enabling GMD to achieve the shootdown of a complex target," said Greg Hyslop, Boeing vice president and GMD program director. "Integrating sensors separated by thousands of miles is a major engineering challenge, but we overcame this challenge by working together as a team."

The test, GMD's eighth intercept overall, was the third intercept since September 2006 using an interceptor with the same design and capabilities as those protecting the United States.

GMD defends the United States against a limited number of long-range ballistic missiles, with interceptors deployed in underground silos at Vandenberg and Fort Greeley, AK. An integral element of the global ballistic missile defense system, GMD also consists of radars, other sensors, command-and-control facilities, communications terminals and a 20,000-mile fiber optic communications network.

Boeing is the prime contractor for GMD. Industry partners include Raytheon, Orbital Sciences, and Northrop Grumman. ■

To Infinity and Beyond!
A ground-based interceptor missile lifts off Dec. 5 from Vandenberg AFB, CA, as part of a test of the Ballistic Missile Defense System. The missile successfully intercepted a long-range target launched from Kodiak, Alaska.

Congratulations to the USSOCOM Stand-Off Precision Guided Munition (SOPGM) Quick Reaction Team for being selected the 13th Annual William J. Perry Award Recipient

This award will be presented at a special luncheon during the Precision Strike Annual Review, March 10, 2009, Ft. Walton Beach, FL.

Visit our website for more details www.precisionstrike.org

News Briefs

ABL Team Fires HE Laser Through Beam Control System

Boeing, industry teammates and the U.S. Missile Defense Agency in late November fired a high-energy laser through the Airborne Laser's (ABL) beam control/fire control system, completing the first ground test of the entire weapon system integrated aboard the aircraft. Northrop Grumman provided the high-energy laser.

During the test at Edwards AFB, the laser beam traveled through the beam control/fire control system before exiting the aircraft through the nose-mounted turret. The beam control/fire control system steered and focused the beam onto a simulated ballistic-missile target.

"This test is significant because it demonstrated that the Airborne Laser missile defense program has successfully integrated the entire weapon system aboard the ABL aircraft," said Scott Fancher, vice president and general manager of Boeing Missile Defense Systems. "With the achievement of the first firing of the laser aboard the aircraft in September, the team has now completed the two major milestones it hoped to accomplish in 2008, keeping ABL on track to conduct the missile shootdown demonstration planned for next year."

The program has logged many accomplishments over the past several years. In 2005, the high-energy laser demonstrated lethal levels of duration and power in the System Integration Laboratory at Edwards. In 2007, ABL completed numerous flight tests that demonstrated its ability to track an airborne target, measure and compensate for atmospheric conditions, and deliver a surrogate high-energy laser's simulated lethal beam on the target. In September 2008, the team achieved "first light" by firing the high-energy laser into a calorimeter aboard the aircraft.

Boeing is the prime contractor for ABL, which will provide speed-of-light capability to destroy all classes of ballistic missiles in their boost phase of flight.

The ABL aircraft is a modified Boeing 747-400F whose back half holds the high-energy laser, designed and built by Northrop Grumman. The front section of the aircraft contains the beam control/fire control system, developed by Lockheed Martin, and the battle management system, provided by Boeing ■

FIRESTRIKE Laser Unveiled

Northrop Grumman recently introduced the FIRESTRIKE laser, a ruggedized, high-energy, solid-state laser designed as a line replaceable unit (LRU) for battlefield applications.

The FIRESTRIKE laser offers warfighters a 15 kilowatt (kW) fieldable laser as well as a combinable LRU building block for much higher power, based on a laser beam combining architecture validated by Northrop Grumman over many years with the Joint High Power Solid State Laser program, Vesta and Vesta II.

"We are ready to deliver on the promise of defense at the speed of light with FIRESTRIKE," said Dan Wildt, vice president of directed energy systems, in the firm's Space Technology Sector. "The FIRESTRIKE laser power per cubic foot has been greatly enhanced from its successful laboratory predecessors."

The FIRESTRIKE laser has been hardened for military uses but also was designed with life-cycle costs and reliability in mind. It allows for scaling a laser weapon to desired power levels for specific warfighting applications and platforms. Northrop Grumman believes that FIRESTRIKE laser will form the backbone of future laser weapon systems. ■

Maverick Missile Upgrades Under Contract

Raytheon was recently awarded a $5.7 million contract option to upgrade software on the AGM-65 H/K TV-guided Maverick air-to-surface missile.

"The software retrofit improves pilots' ability to visually identify and engage distant targets," said Col. Eric Theisen, Air Combat Command's Advanced Programs division chief. "This translates into greater standoff distance for the weapon and better survivability for the operator."

The upgrades also provide the operator with more combat engage-

CALENDAR OF EVENTS

Precision Strike Annual Review
Date: March 10-11, 2009
Theme: *"New Administration—Future Strategy for Precision Engagement"*
Location: Emerald Coast Conference Center, Ft. Walton Beach, FL

Armaments Technology Fire Power Forum
Date: June 9-10, 2009
Location: Hanover Marriott, Whippany, NJ

Precision Strike Technology Symposium (PSTS-09) SECRET/NOFORN
Date: October 27-29, 2009
Theme: *"Improving Precision Weapons to Win the War on Terror"*
Location: Johns Hopkins University Applied Physics Laboratory, Kossiakoff Center, Laurel, MD

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

ment opportunities.

"The upgraded software reduces aircrew workload, while improving the missile hit rate and accuracy," said Harry Schulte, vice president of Raytheon Missile Systems' Air Warfare Systems' product line. "The Maverick has always been ideal for close air support missions; now it's even better." ■

Air Force Engineers Test Army Weapon

Arnold AFB engineers conducted an aerodynamic test on the Army's Mid-Range Munition (MRM) recently, providing a new and critically needed performance evaluation capability for current and potential test customers.

The purpose of the test, which took place in the Arnold Engineering Development Center's four-foot transonic wind tunnel, was to determine the aerodynamic lift and drag forces and moments the guided projectile will experience in flight.

What made this test unique was the successful operation of a novel remote control system that efficiently determined the projectile's performance limitations while saving the Army time and money in the process, said Charlie Smith, the project engineer for Aerospace Testing Alliance's (ATA) integrated test and evaluation department.

"A large amount of data was required to compare various configurations of the test article and determine performance, stability, and control effectiveness of the optimum configuration," he said. "Instead of just moving the projectile's control surfaces to a fixed position by remote control, we were able to automatically position the canards to maintain the measured projectile pitching, rolling, and yawing moments at a specified value, usually zero (trim), while simultaneously pitching and rolling the projectile at simulated flight conditions. We are approaching a 'fly the mission' capability with this development."

Canards are moveable, wing-like structures located near the front of the projectile used to guide the projectile. Additional fixed-position fins are located at the rear of the projectile to provide stability and lift.

The collaboration between ATA, the Air Force and the test community resulted in an improved capability that would have positive, long-term implications, said Dr. Richard Roberts, Arnold's Air Force project manager on the test.

According to Raytheon, the MRM projectile is being designed to provide the U.S. Army with a lethal, one-shot capability as the service continues its transformation to lighter, more deployable combat forces. ■

First Guided Test Flight of PAM From CLU

NetFires LLC, a joint venture between Raytheon Missile Systems and Lockheed Martin Missiles and Fire Control, completed the first guided test flight of the Non Line-of-Sight-Launch System's (NLOS-LS) Precision Attack Missile in late November at the White Sands Missile Range, NM.

The PAM missile, launched from a Container Launch Unit, used its digital, semi-active laser seeker to score a direct hit against a T-72 tank target. The test demonstrated the performance of the complete NLOS-LS system. While guiding to its intended target, the PAM missile joined the network with its onboard radio and sent back a terminal target image. The PAM missile also operated as a node on the net throughout the flight.

"NLOS-LS once again proves it is on a path to meet the Future Combat Systems' lethal requirements," said Col. Doug Dever, the U.S. Army's NLOS-LS project manager. "This is good news for the soldiers who will one day rely on this innovative and effective weapon system in the field."

The U.S. Army is accelerating the delivery of NLOS-LS to soldiers in its 43 infantry brigade combat teams.

The NLOS-LS is one of the 14 Future Combat Systems core systems. As part of the FCS systems-of-systems, the NLOS-LS will meet the requirements of the Army's future brigade combat teams by providing increased capability for the current force's modular BCT (Brigade Combat Team). ■

Additional Photos from PSTS-08

PSA Chair Bill Dalecky (right) congratulates Dr. Robert Dougherty—Deputy Business Area Executive, JHU/APL for 35 years of dedicated service to the precision strike community.

Col Bill DeMaso USAF, CAPT Mongo Sears USN, Dr. John Wilcox, Bill Dalecky, Lt Gen (Ret) Tom McInerney USAF, Ginny Sniegon, John Walter, Col Eric Thomton USAF and Col West Anderson USAF

Schedule at a Glance

PRECISION STRIKE ANNUAL REVIEW (PSAR-09)

10-11 MARCH 2009

EMERALD COAST CONFERENCE CENTER
FT. WALTON BEACH, FL

(PSAR-09 will be presented by PSA with generous support from the USAF Air Armament Center and the Gulf Coast Chapter of NDIA)

New Administration—Future Strategy for Precision Engagement

PSAR-09 will showcase:

New Administration & Technologies
Industry's Perspective on Changes for Precision Strike
Joint Precision Engagement
Defense Issues, Challenges and Strategic Direction
Joint Strategic Planning System
Weapons Technology Projects & Roadmap
13th Annual William J. Perry Award Ceremony
Department of the Navy's Future Precision Strike Capabilities Session
International Programs Perspective Session
Use of Precision Strike Assets within a Multinational Perspective
Special Operations in the Kill Chain
Warfighting, Engagement & Development
Army's Future Precision Strike Weapons Systems Session
F-35-Joint Strike Fighter Program
Acquisition Strategies for C4ISR
Future Direction for Industry
Air Synergy with Future Coalition Forces Session
Flexibility our Precision Weapons bring to the Fight

Golf available on the afternoon of 9 March 09
FALCON or EAGLE Golf Course-Eglin AFB

Details and Registration Information are available at www.precisionstrike.org
Dawn Campbell 703-247-2590 – email: dcampbell@precisionstrike.org

IN THE NEXT ISSUE

Wrapup on Precision Strlke Annual Review

PRECISION STRIKE ASSOCIATION CORPORATE MEMBERS

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I hearby apply for membership in the Precision Strike Association. My understanding is this entitles me to invitations to appropriate Association activities, the quarterly newsletter and other benefits.

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Include $10 for each individual membership requiring mailing outside of North America.

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