

The
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“Dedicated to advancing the art and science of
precision engagement concepts and technology”



**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.*

The Buzz about Precision Strike Winter Roundtable

The 2007 popular all-day Winter Roundtable, sponsored by PSA, is scheduled for Thursday, 1 February 2007 at the Crystal City Marriott's Crystal Forum. The Roundtable's theme **Precision Engagement—Strategic Context for the Long War** sets the tone for a new year full of exciting challenges, demands, and continuing opportunities for government and industry collaboration on precision engagement. As we struggle to win the long war and support the Defense Department's 2006 Quadrennial Defense Review (QDR) report mandate to reshape the defense enterprise in ways to better support the warfighter, we must anticipate the shape of the new political landscape as well.

Winter Roundtable has been structured to provide insights to policies and strategies from the perspective of those charged with implementing and executing both. High level decision makers from Congress, Defense, Industry, and Academia will share their visions and perceptions, while discussing the critical role precision strike plays in shaping our national security environment.

Further, Dr. Bill Perry plans to be on hand to present the 11th William J. Perry Award. Perhaps Dr. Perry—a member of the Iraq Study Group—will share highlights as well of the commission's findings and recommendations. Also, a couple of congressional leaders who make decisions on our nation's precision strike weapons will present their perspectives on Defense-related priorities and issues.

Additionally, other top visionaries and strategy experts—including Peter Huessy (President, GeoStrategic Analysis), John Wilcox from OSD, RADM James Winnefeld from USJF-COM, Frank Cappuccio from Lockheed Martin, and COL Bill Hix USA from the Joint Staff will talk about policies and strategies that impact precision engagement. So, please join our outstanding and dynamic speakers as they highlight key national security challenges facing our great nation. Note page 15 of this Digest for a listing of major topics to be addressed during Winter Roundtable 2007. ■

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The Long War—that's what USAF Brig Gen Mark Schissler, Deputy Director for War on Terrorism (J-5), The Joint Staff briefed attendees to open PSA's most recent Precision Strike Technology Symposium on 17 October 2006.

This will be a protracted struggle that pits the hope of democracy against the tyranny of religious extremism—surely not very fertile ground for Precision Strike technologies to bloom, right? In early June of this year, Aviation Week & Space Technology related the following:

USAF officials are giving partial credit to Northrop Grumman's Litening AT pod for the precision of last week's F-16C attack that killed Abu Musab al-Zarqawi and several top lieutenants of Al Qaeda in Iraq.

One F-16C first dropped a 500-lb. GBU-12 laser-guided bomb, followed by a 500-lb. GBU-38, a Joint Direct Attack Munition that uses a GPS-guided fin kit, to reach the target. USAF Lt. Gen. Gary North, the commander of air forces in Iraq, says the remote safe house about 40 mi. northeast of Baghdad was not a time-sensitive target, allowing the pilots to take full advantage of the Litening pod's surveillance capabilities before attacking.

Litening, a forward-looking infrared and laser-designator pod, allows pilots to release weapons 4-5 mi. from a target while maintaining a clear view of the area of attack.

Prior to the bombing run, North said, commanders had "100% assurance" al-Zarqawi was in the house. North said the building was solidly constructed with rebar reinforce-

ments. The pilot dropped the second bomb to ensure the target was destroyed.

Find, Fix, Track, Target, Engage, and Assess-the Kill Chain. It applies in a wide range of operational scenarios—in fact, it applies in all operational scenarios, whether hunting massed enemy forces or small groups of leadership targets. Tactics and even strategies will change to better suit the objectives of the commander or the nation, but the Kill Chain has become the enduring construct by which planners can best deliver precision engagement capabilities to the Combatant Commanders and their coalition partners in the field.

One of PSA's missions is to facilitate communication between leaders in government and the commercial sector that fosters a beneficial exchange of information. We want to broaden PSA's reach and affiliation into areas of government and industry that span the Kill Chain. Paul Greenberg, our executive director, will be focusing his efforts this year on just such an outreach. Please help us penetrate the darkness of the uninitiated and steer those you might know in government or industry who are not familiar with PSA and what we are about in Paul's direction so that we can bring them into the fold. He is up on the net at pgreenberg@ndia.org

Next up is Winter Roundtable in February. This strategy and policy oriented event is always well attended and will prove to be very interesting as the 110th US Congress is convened. See you there!

Bill Dalecky

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PSTS '06 Wrapup

The Precision Strike Association held its 16th Precision Strike Technology Symposium October 17-19, 2006, in the Kossiakoff Conference Center at the Johns Hopkins University Applied Physics Laboratory (JHU/APL) located in Laurel, MD. Under the leadership of PSA Programs Chair, Ginny Sniegon, Dr. John Walter from JHU/APL and George McVeigh from SAIC co-chaired this very successful symposium.

Dr. Jerry Krill, Assistant Director for Programs at JHU/APL, welcomed the Precision Strike Community to PSTS-06.



Dr. Jerry Krill

He reflected on the theme “Capabilities Required for Global Strike—Technology Implications for the Future” and noted that many top industry leaders and military decision-makers would present the latest advances in next-generation technologies during the three-day SECRET/NOFORN symposium.

Further, Dr. Krill highlighted a statement made by Dr. Paul Wolfowitz when he was the Deputy Secretary of Defense and addressed PSTS back in 2004 that noted “the most important targets are the ones that move around, staying put for only short periods of time.”

Dr. Krill believes there is wide agreement with Dr. Wolfowitz’s conclusion, and noted that his observation is true for strike operations from the tactical to the global. The important difference for Global Strike is that the network connection is longer with more opportunities for delay and information loss.



BG Schissler

USAF Brig Gen Mark Schissler gave a timely briefing on the Long War. He pointed out that we have, in fact, been in a hot war with extremist Islamic groups virtually non-stop for nearly 20 years. While the enemy in our view is terribly misguided in their geopolitical views, they are absolutely committed to their cause and operate inside of a very large population base from which to draw recruits. They have become very proficient at fighting asymmetrically from our points of strength. This capability coupled with their desire to acquire weapons of mass destruction and their expressed willingness to use such weapons makes them an extremely dangerous foe. For these reasons the struggle will be long as we protect the homeland.

USAF LtGen Bob Kehler, Deputy Commander, U.S. Strategic Command



USAF LtGen
Bob Kehler

(STRATCOM), delivered the opening keynote address, expressing his thanks for the opportunity to address such a large audience about precision strike capabilities required for global strike, as well as technology implications for the future.

LtGen Kehler noted that as America enters the fifth year of a long, irregular war, facing an adversary who attacks through asymmetric means, makes it clear that tailored deterrence requires a more complete range of capabilities to address the wide spectrum of challenges. He stated that it is unlikely that the U.S. will have forces everywhere they may be needed when they may be needed. Global strike—the capability for accelerated planning and execution using the full range of kinetic and non-kinetic capabilities in support of national or theater commanders’ objectives—is a potent answer to this dilemma.

LtGen Kehler mentioned that the U.S. has the capability to engage with high quality conventional forces around the world. He declared that we also have nuclear weapons, electronic weapons or even words—strategic communications—that can be used for our nation’s defense. Further, he focused on the fact that our adversaries are using unconventional means to try to attain their goals, and stressed that we need weapons that can arrive on target quickly. The most pressing challenge lies in the first hour, and calls for a prompt, precise conventional global strike capability. Prompt global strike will provide the President with a wider range of response options to the full range of contingencies.

STRATCOM’s responsibilities as planner, advocate and enabler make it uniquely qualified to lead this charge. LtGen Kehler recognizes the fact that nuclear ballistic missiles are not the answer to the many challenges characteristic of the 21st Century security environment, but stated that we must consider the full range of asymmetric threats we face today and how best to deal with them.

Next, the **Targeting Session**, chaired by **JT Morris** of Whitney, Bradley & Brown, was kicked off with a presentation by **Jim Kuzmick**, Chairman of WB & B. His presentation laid the framework for later papers that focused



Targeting Session

on this symposium's sub-theme of precision strike against moving targets. Kuzmick highlighted the types of targets contained in the mobile target set and the need to attack them with a degree of precision and lethality not yet achieved in our current weapon inventory. He began by focusing on the "need" for this type of capability, its history and pedigree, and then reviewing the capabilities of today's weapons against mobile targets. The crux of his presentation was highlighting the conditions that limit engagement of moving targets in a precise manner to be orders of magnitude more difficult than engaging conventional fixed targets precisely.

He summarized that emerging technologies and solutions must address conditions of weather, clutter and rules of engagement in an operating environment and must consider the implications and issues those technologies and solutions bring to the battlefield.

Michael Weitalla, a Senior Systems Engineer for Raytheon's Joint Battle Management Advanced Technology Programs, Ft. Wayne, IN, followed with a presentation that focused on a joint approach for target management in the prosecution of time sensitive targets. Weitalla's approach presented an analysis of the current state of joint targeting and proposed a migration path focused on collaborative joint targeting and distribution of tactical intelligence to optimize the decision process for the precision strike of time sensitive targets. He proposed a path forward evolving the current implementation into a solution that can provide an incremental path beginning with the utilization of existing interfaces to retrieve and share data among the U.S. military services.

Bryan Pettitt, a Senior Staff Research Engineer and Manager of the Signal and Image Processing Group at Lockheed Martin Missiles & Fire Control, Dallas, TX, concluded the targeting session with a presentation on 3-dimensional (3D) targeting for enhanced precision strike. This technology would assist in answering the need to precisely locate and report a target with very high probability of identification and achieving the goal of directing a weapon to a very precise aim point resulting in enhanced lethality with reduced collateral damage. 3D LADAR (laser detection and ranging) coupled with 3D ATR (automatic target recognition) algorithms might provide a proven approach to this need. Through videos, Pettitt demonstrated the ability of a 3D LADAR seeker to search, identify, and precisely locate an aim point on a target during multiple free flight engagements.



USAF Col
Len Litton

USAF Col Len Litton provided the audience with an excellent overview of the USAF's Global Strike CONOPS. The

capability requirement has both a near-term and far-term parameter. In the near-term, U.S. STRATCOM and the other Combatant Commanders require rapid global strike whereby targets can be attacked worldwide in very short times. The Air Force is working in the Joint arena to deliver that capability now. In the longer view, Long Range Strike as a new system is tagged for development with an initial operational capability (IOC) in 2018. Col Litton's presentation was a superb synopsis of both efforts.

Greg Hulcher, Assistant to the Deputy Under Secretary of Defense (Acquisition and Technology) updated symposium members of the latest developments and accomplishments of recent OUSD (AT&L) activities, and challenged them with a new definition for circular error probable in the context of achievable precision.



Greg Hulcher

John Landon, DASD (C3ISR and IT Acquisition) presented the latest situational awareness (SA) activity underway within the ASD (NII) realm. SA remains the heart of precision targeting of both fixed and mobile targets.



John Landon

Next, **Buck Buchanan** chaired the **C4ISR Session** entitled "Enabling Effective Decisions" was presented by **Jim Hillman** from JHU/APL. This briefing described what the ops environment decision-makers will be operating within and what C2 systems will be needed. Hillman described the operational environment as complex and diverse and noted that real world conflict features the interaction of opposing ideas. Hillman made the point that the key to success is understanding these interactions; when and how to use each; and to transition seamlessly from one to the other. Agility will be key.

The next speaker was **USN CAPT Mathias "Mat" Winter** who is the Commander of the Precision Strike Weapons Program Office (PMA-201) at NAS Patuxent River, Patuxent River, MD. He spoke about a Navy and Air Force proposed FY07 Joint Capabilities Technology Demonstration (JCTD) for Joint Surface Warfare in the Littorals. This JCTD is going to address a problem Combatant Commanders have in ensuring target destruc-



C4ISR Session

tion (with minimal collateral damage) in an all-weather, congested maritime environment in which enemy combatants are intermingled with neutral commercial shipping; all the while maximizing U.S. force survivability.

The last C4ISR speaker was **USAF Lt Col Don “Drex” Drechsler** who commands the Air Force’s Distributed Mission Operations Center (DMOC) at Kirtland AFB, Albuquerque, NM. Lt Col Drechsler described the DMOC as a very successful modeling and simulation environment used for warfighter training, experimentation, and test and evaluation. Applications within this environment concentrate on team, inter-team, large force, and theater-level sensor-to-shooter kill chain training and full C2ISR integration.

It was the widespread application of distributed technologies such as this that enabled theater-level exercises, such as the Virtual Flags. Virtual Flags are quarterly exercises hosted by the DMOC that link hundreds of warfighters in realistic and robust scenarios. Virtual simulators, in which warfighters can practice force employment the same way they would with real weapon systems, represent most Air Force airborne sensor, C2, shooter, and unmanned platforms. Many ground-based systems, such as the Combined Air Operations Center, as well as Joint and Coalition participants, add to the training realism and depth.

The **Weapons Session** on Oct. 18 chaired by **USAF Col Jim Baker**, went off marvelously. Our first briefer was **Jeffrey Gross**. His presentation focused the group on the high level picture of improving technology for precision strike operations—in particular, treating weapons as “on the network edge” elements. Today, weapons data links are networks in name only—often only a small pipe from platform to weapon. He pointed out both the possibilities and the pitfalls of weapons acting just like any other network appliance. He finished his talk briefly explaining how Harris Corp. has actually prototyped some advanced weapons data link terminal technology.

The next speaker was **Greg Smith**, currently with Innovative Concepts. Smith presented a highly detailed and thorough briefing on a high level system architecture for retargeting, inflight tracking, bomb damage indica-



Weapons Session

tions, and control and hand-off weapons. He walked through how his company has actually worked with the warfighters to introduce UHF VMF, and how this protocol can be expanded to handle problems of throughput, latency and jam resistance.

The Weapon Session ended with a very intriguing discussion by Raytheon’s **Michael Cook**. Raytheon, has been building weapons and weapons components for years. But to the four design constraints we usually associate with weapons (small volume, low weight, not much power, high shock/vibe environment), our adversaries have now handed us another — GPS anti-jam. His presentation showed how Raytheon has adapted Micro-Electro-Mechanical-Systems (MEMS) technology to produce a small lightweight but robust AJ system for providing weapons guidance—with even better products in the pipeline.



Honorable Francis J. Harvey

The Oct. 18 keynote address was a presentation from the **Honorable Francis J. Harvey**, Secretary of the Army. He described the Army of today and its ongoing transition from Division Centric to a smaller, more agile Brigade Combat Team, which will have greater mobility and operate over a much larger battlespace. This force will be equipped with the Future Combat System (FCS) family of vehicles and support equipment. As components become available they will be spun off to this new force. He stressed the role of today’s Army as an essential partner with the other services on today’s joint battlefield.

Next **Jim Tedeschi**, Director, Center for Countermeasures, White Sands Missile Range, introduced the audience to the world of dynamic countermeasures testing of sensors and seekers, many of which are



Jim Tedeschi

critical components of precision weapons. Then **Robert Hunter**, also of White Sands, described the “Joint Mobile Infra-Red Counter Measures Test System” which, when completed, will improve and speed up the testing process.



Robert Hunter

LtGen Thomas G. McInerney, USAF (Ret)—a Fox News military analyst—was the second day’s featured luncheon speaker and talked about “The End Game for the Global War on Terror.” He built the case for precision strike in the context of the conflicts in Iraq and Afghanistan, and the future challenges we face in terms of countering the goals of Muslim radicals to create a global Islamic empire.



LtGen Thomas G. McInerney

His assertion that the “Web of Terror” is global was validated by the span of major terrorist attacks and by documented evidence of the extremist goal to destroy our way of life to include nuclear attacks on U.S. cities. He asserted that elements within Saudi Arabia, Iran, Syria, and Pakistan are the primary source of support for the radical Muslim extremist.

McInerney believes that covert operations to effect regime changes within Iran and Syria—combined with diversified economic and political reform in Saudi Arabia—are essential elements to win the “War on Terror.” He is also concerned that the large Muslim extremist population in Pakistan (Taliban and al-Qaeda) creates an unacceptable risk of nuclear proliferation should the current regime be toppled.

As far as North Korea is concerned, the threat to our national security created by their nuclear weapons program is unacceptable. Iran observed both of North Korea’s latest test events—long range missile firing and nuclear test. McInerney is concerned that if Iran is working with North Korea, then the timeline for Iran to create a nuclear weapon may be much sooner than if they are working alone. In either case, the threat of nuclear weapons from either North Korea or Iran is unacceptable to U.S. national security, and military action must not be ruled out.

His luncheon remarks concluded with a very lively Q&A session. McInerney noted how important work of the Precision Strike Association is to our nation in the War on Terror.

Next, **Dr. Frank Dellermann**, Deputy Director for Strategic Strike in OSD Policy, highlighted the role of prompt global strike in the 21st century. He stated that the 2006 Quadrennial Defense Review (QDR) assessed the security environment of the 21st Century and underscored the need for a prompt, precision, long-range conventional strike capability to provide The President with a broader range of options to respond to high-consequence, fleeting targets.



Dr. Frank Dellermann

Further, he noted that the QDR recommended that a near-term solution to achieve this capability was the Conventional Trident Modification (CTM)—replacing two nuclear-armed Trident II D5 missiles on our 12 operationally deployed strategic submarines with conventionally-armed missiles.

However, Dr. Dellermann mentioned that progress towards CTM has been hampered, in large part, due to the lack of consensus in Congress and elsewhere on the wisdom of seeking a prompt global strike capability.

Some believe the concept of prompt global strike to be flawed, inviting reckless behavior and that the use of ballistic missiles, even though armed with conventional warheads, could lower the nuclear threshold. Extensive historical evidence contradicts the contention of reckless behavior (from the U.S. and others) and shows that CTM continues the post-Cold War trend of reduced U.S. reliance on nuclear weapons. In fact, replacing nuclear-armed missiles with a conventional alternative raises the nuclear threshold. Nevertheless, there remains an influential minority that is not yet convinced. Recent congressional CTM budget action that cut the President’s request \$127M in FY 07 to \$20M for R&D, was predicated largely on these concerns.

Dr. Dellermann stressed that it is imperative that the defense community do a better job in framing the debate and in addressing these concerns. He declared that we must more clearly present coherent operating concepts and have a clear, compelling rationale at the outset for the prompt global strike capability we believe is more effective. It is DoD’s belief that prompt global strike is a needed capability to meet the United States’ evolving 21st-century security needs for assuring allies and friends, dissuading and deterring adversaries, and defeating adversaries should deterrence fail.

Kaman Fuzing’s **Dale Spencer** stood in for organizer and moderator Earle Rudolph in a follow-on to the Annual Program Review panel on **Directed Energy Weapons**.

Colonel John Costa, USAF, kicked off the discussion with a government perspective. From when Dr. Theodore Maiman generated the world’s first laser beam on 15 May 1960, directed energy weapons became the “Wave of the Future” to today where they remain in laboratory environments. **Col Costa** discussed the why, and how they should be transitioned to today’s warfighter, pointing out that directed energy solutions sit at the nexus of technological maturity, with the ability to fill critical capability gaps and threat response. He noted that high energy lasers and microwave systems are the only current answers that can meet the requirements of all three areas simultaneously and that sensing to responding on an individual



DE Weapons Session

and subcomponent level places unique demands on maturing hardware and C4ISR systems. He sees the need for “speed-of-light” to fight “speed-of-light”. The Advanced Tactical Laser has earned the distinction of becoming the AF DE/HEL cornerstone.

Panelist **Dr. Gary Koop**, Chief Engineer (ret), Northrop Grumman, focused on the status of laser weapon system development and the utility of directed energy systems for military applications. Multiple chemical lasers have demonstrated MW-class power levels in the past and Solid State Lasers are on a path to demonstrate 100 kW operation by 2008, viewed as the entry power level for many “hard target” engagements (such as rockets and mortars).

System level demonstrations have been performed on the Tactical High Energy Laser (THEL) program validating military utility against a wide range of difficult threats, including supersonic rockets, mortars, and artillery shells. Laser weapon system packaging and integration issues have been addressed on the THEL and the Airborne Laser programs.

Dr. Koop concluded that laser weapons have matured to the point where they are ready for transition from the laboratory to the battlefield. A key element in making this transition will be garnering support from the warfighter community to specify requirements that will drive the acquisition process. Participation in war gaming activities provides an effective way of gathering this support by exposing the benefits of laser weapon system to a wide range of high-level decision-makers.

Panelist **Lee Gutheinz**, Program Director for High Energy Laser/Electro Optical Systems for Directed Energy Systems, Boeing-SVS, Inc. provided the insight that tactical laser/relay systems have many features with significant operational implications for addressing a range of challenges posed by emerging asymmetric warfare. The ability to shorten the “Kill Chain” response time is significantly enhanced through persistent intelligence, surveillance and reconnaissance (ISR) coupled with speed of light target engagements. Low collateral damage is not only possible, but should be expected. With an “electric laser” as a source-solid state, fiber or free electron systems will have effectively “infinite” magazine potential.

An entry level laser-relay, consisting of a moderately powered fixed ground source with an aerostat based optical relay, has multi-service, multi-mission potential, especially providing persistent and over-the-horizon surveillance for forward operating bases or port areas. It will also allow direct engagement based on real time interpretation of evolving tactical risks. The inherent ability to respond to threats with a range of effects from non-lethal

through lethal increases the probability that the system will be used when needed and that the results will be in proportion to the desired effect. Current technology supports the development and field deployment of this capability within two years of a positive decision to proceed.

Dr. Anthony Castrogiovanni, VP, Strike Weapons and Directed Energy for ATK, rounded out the panel, discussing high power microwave technology.

This year’s **Effects Session** chaired by **Susan Kennedy** of JHU/APL, consisted of three presentations. The first presentation looked at using technology of today in a different way to reduce cost and provide more flexibility. The second presentation addressed the more traditional effects problem, discussing the effects of precision guided weapons against basements and basement bunkers. The third presentation challenged the audience to think about effects and the word precision differently, considering not only kinetic but non-kinetic effects.

Our first speaker was **Dr. Alan England** from the Mustang Technology Group. He is the Program Manager of the Fuze Air-to-Surface Technology (FAST)link program. Dr. England discussed the concept of using the FAST radar, which was designed to provide precision altitude and height of burst fuzing, as a low-cost weapon data link. Since the FAST radar already covered the Link 16 band, it was a nature fit to also function as a data link. This kind of dual use component allows for reductions of the size, weight, power, and cost of weapon hardware. The demonstration of the FASTlink concept proved its ability to function as a low-cost, Link-16 network-enabled weapon data link and proximity fuze sensor, thus providing the opportunity to augment the target set of INS/GPS guided weapons such as JDAM to include relocated and moving targets.

Our next speaker was **Steve Proksh**. Proksh is an intelligence analyst with the Physical Vulnerability Division at DIA. Proksh discussed the vulnerability of basements and basement bunkers to precision guided munitions. He explored the targeting, penetration, and weapon effects issues that must be addressed when planning attacks on these targets. His analysis was based both on historical



Effects Session

weapon employments and data from recent detailed assessments of Operation Iraqi Freedom munitions effectiveness. Factors such as warhead type and size, fuzing, delivery accuracy and multi-story building penetration mechanics were used in the analysis. Specifically, the presentation provided a method for calculating the probability of a munition avoiding all beams in a building during vertical penetration. It showed how the probability of avoiding beams is influenced by impact angle, munition CEP, and building construction. This probability may be incorporated into mission planning for any specific target to improve the weaponeering solution.

Final Effects Session speaker was **USAF Major Jack Sine**, who recently graduated from the Naval Postgraduate School National Security Affairs program. Major Sine proposed a doctrinal definition for “precision weapon” that creates a comparative concept of preciseness as opposed to a descriptive one. Typically when we think of precision, we are talking about a weapon’s guidance system accuracy. This definition has worked well with kinetic effects, but does this definition still apply to non-kinetic effects? Major Sine challenged us to consider precision as the preciseness of the effect the weapon achieves, which considers not



only navigation accuracy, but also weapon effects, undesired effects, and potential unintended effects.

On Oct. 19, **Steve Henry**, DASTSD for Nuclear Matters, discussed “Nuclear Issues—How They Relate to Precision Strike Requirements,” updating symposium attendees on current and forecast activities.

Glenn Baugher, Defense Treat Reduction Agency, presented an update on thermobaric weapon developments. He provided classified updates on specific



Glenn Baugher

weapon results initially presented at the April 2006 PSA Programs Review.

David Rosenblatt, Director of Advanced Systems, L-3 Communications, ComCept Division, presented “Sensors Forward: Collaborative Sensor Networking for Global Strike,”—a most thoughtful and intriguing methodology for



David Rosenblatt

combining inputs from multiple platforms.

George Meyer, Deputy Program Manager (PMA-281), presented a most thoughtful and enlightening presentation on recent and planned changes to Tomahawk mission planning and missile communications.



George Meyer



John Liebsch

John Liebsch, Director, Future Warfare Systems Office, National Geospatial-Intelligence Agency (NGA) updated the attendees on the most recent activity of the NGA. NGA is no longer just your ‘maps and charts’ agency.

The keynote address by the **Honorable Mike Wynne**, Secretary of the Air Force, was the highlight of the final day of this year’s PSTS. Secretary Wynne and USAF Chief of Staff General “Buzz” Moseley are forging new goals and moving the USAF rapidly down the path of Transformation while providing the Combatant Commanders with unparalleled air power, denying enemies the sanctuary of night, depth, or weather. While speaking to the PSTS attendees, Secretary Wynne communicated his desire for a new Cyberspace Command (and his frustration that it wasn’t happening faster). Only a few days later the formation of the Command was announced by the USAF.



Honorable Mike Wynne

LtCol Chuck Kelly, USMC, Joint Staff (J-8), Force Application Assessment Division, discussed the Most Pressing Military Issues (MPMI) process being developed to assist the Joint Requirements Oversight Council (JROC) in focusing their efforts on the critical issues for the Department. He noted that the impetus for the MPMI was the Vice Chairman’s concern that JROC topics were filtered and bottom-up driven. As a result of this concern, the J-8 was tasked to develop a list of most pressing military issues as a focusing construct for the JROC. The initial MPMI list was approved by the JROC with some modifications and binned to the appropriate Functional Capabilities Boards (FCB) for lead and support actions that included assessing, scoping, and further refinement of the issues.



Chuck Kelly

The next step in the MPMI process development is the creation of plan of action and milestones (POAM) for each of the issue areas. When completed, these POAMs will be briefed to the JROC for approval. The MPMI post assessment will enable the prioritization of the JROC



Warfighter’s Panel

calendar, facilitate discussion, and focus efforts. LtCol Kelly pointed out that the MPMI process will help influence strategic documents, direct analytic efforts, focus S&T efforts, and inform the JROC on investment decisions. The bottom line is that the MPMI allows the JROC to get ahead of and influence strategic choices.

PSTS-06's closing session featured the popular **Warfighters' Requirements Panel**. Captain Jeffrey Cathey, USN, from OPNAV's N8 office moderated this panel which included perspectives from **CAPT Matt Winter** USN (PMA-201), **CDR Tony Wright** USN (N88), and

USMC LtCol Chuck Kelly. Panel members focused on the analysis of the complete kill chain and kill mechanisms and addressed perspectives related to resources, acquisition, capabilities, and scenario-based assessments.

For the fourth consecutive year, **32 midshipmen** from the U.S. Naval Academy's Weapons and Systems Engineering Department participated in a PSTS. As the next generation of military leaders, this was a superb opportunity to witness presentations on many of the precision strike systems they will be operating after they graduate and become commissioned officers. ■

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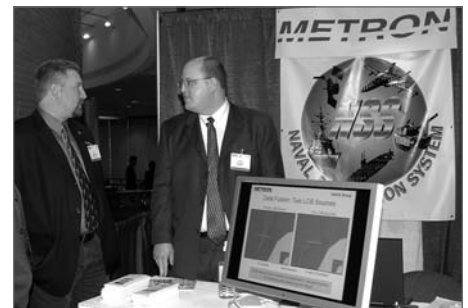
Lockheed Martin with the USNA Midshipmen



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Stealth Fighter Heads Towards Retirement

After 25 years of storied service, the Lockheed Martin F-117 Nighthawk—the U.S. Air Force’s first stealth fighter—is about to retire.

The technology that once made it unique has now caught up to it, and newer fighter aircraft are joining the fleet. Still, the Nighthawk was the first of its kind, a fact anyone who has spent time around the aircraft is quick to point out. The aircraft has an illustrious history—a history that contains as many secrets as it does legends.

Part of the Air Force’s arsenal since 1981, the Nighthawk was the stuff of science fiction. It could fly across enemy skies and through the world’s most advanced radar systems without being detected. This capability allowed the aircraft to perform reconnaissance missions and bomb critical targets, all without the enemy knowing who or what had hit them.

“This is a strategic weapon that really reshaped how the Air Force looked at strategic warfare,” said USAF Lt. Col. Chris Knehans, commander of the 7th Fighter Squadron. “It doesn’t matter what defenses you put up or how deep you try to hide, this airplane will come and get you.”

This fact has made the Nighthawk a vital part of the Air Force’s various campaigns since the aircraft’s introduction. It has seen service in Panama, Iraq, Afghanistan and Bosnia as part of such operations as Desert Storm, Allied Force, Just Cause, Enduring Freedom and Iraqi Freedom.

For those who either fly or provide support to the Nighthawk, the aircraft has been a faithful one. Knowing it is now in its last days is bittersweet for many of them.

“From a pragmatic point of view,



The F-117 Nighthawk penetrates high-threat airspace and uses precision guided weapons against critical targets.

we all understand why it’s leaving,” Knehans said. “I mean it’s a 30-year-old concept now. But when you look at its history, its design and its combat record, ... yeah, the Air Force is going to lose basically a very unique weapon system.”

For Master Sgt. Byron Osborn, who has worked on the F-117 for almost 19 years, the emotions are clearer.

“For old-timers like me, it’s a sad day,” he said. “A lot of the younger guys like the new, flashier aircraft, but I’ll stick with this old dog any day.”

The Air Force is saying goodbye to the F-117, but not to the effect it has had on modern warfare. Its successor, the F-22 Raptor, will continue the fight the Nighthawk started, which, according to retired General Lloyd “Fig” Newton, one of the first F-117 pilots, is a hard job to fill.

“Whenever its nation called, the F-117 answered, providing capabilities that had never been known before,” he said. “If we needed the door kicked in, the stealth was the one to do it. Never before had such an aircraft existed.”

Modern technology may have caught up with the F-117 and new aircraft may be set to take its place on the tarmac, but for those who have been part of its storied history,

none will ever be able to replace it.

Although soon to be mothballed, the Nighthawk remains combat ready. From Sept. 28 to Oct. 1, the entire F-117 fleet at Holloman AFB, NM was 100 percent mission capable.

“It is unusual for a fleet of any size to go to 100 percent mission capable,” said USAF Col. Gary Bryson, 49th Maintenance Group commander. “The planes fly, the planes break and even at the end of the flying-hour program and fiscal year, we often have hard-broke airplanes that take longer to fix or are awaiting parts for repair.”

Mission capable means the plane is ready to fly, said Col. Bryson. The aircraft systems are not broken, there are no parts waiting and all the radar absorbent material coatings are within war-ready status.

“Maintainers truly performed as a team to meet this feat,” said USAF Chief Master Sgt. Wendy Jones, 49th Aircraft Maintenance Squadron. “The group utilizes sound maintenance practices in fixing aircraft with a history of maintenance problems.”

“For all the planets to line up and have both (aircraft maintenance units) go 100 percent is something that no one on the F-117A maintenance team has ever seen,” said Col.

IOC for Small Diameter Bomb

The Air Combat Command (ACC) commander declared initial operational capability (IOC) for the Guided Bomb Unit-39/B Small Diameter Bomb on Oct. 2 and the weapon made its combat debut just three days later.

Gen. Ronald E. Keys made the IOC announcement six months ahead of schedule, only weeks after it was initially delivered to the warfighter in early September for Air and Space Expeditionary Force 3/4.

The GBU-39/B—made by Boeing—was flown into combat for the first time Oct. 5 by members of the 494th Expeditionary Fighter Squadron based in Southwest Asia. A two-ship formation of F-15E Strike Eagles carried the new air-to-ground bomb while providing close-air support for ground troops operating in Iraq.

Lt. Col. Will Reese, commander of the 494th Fighter Squadron at RAF Lakenheath, called the SDB I “a great weapon of choice,” and he recognized Boeing’s work to integrate the capability with the F-15E.

Col. Richard Justice, 918th Armament Systems Group commander and SDB program manager at Eglin Air Force Base, FL, also applauded the teams’ work, saying, “Ahead of schedule, under cost, exceeds requirements, suitable, effective and mission capable’ are a string of words, to my knowledge, never before associated with an Air Force Acquisition Category 1D program. This program is truly one of the most remarkable successes in Air Force acquisition history.”

Boeing officials call the bomb “the next generation of low-cost and low-

collateral damage precision strike weapons for employment from fighters, bombers and unmanned aerial vehicles.”

The F-15E Strike Eagle is the only aircraft currently equipped to carry



Staff Sgt. Randy Broome signals a jammer operator to move a Bomb Rack Unit 61/A forward, while loading it onto an F-15E Strike Eagle at RAF Lakenheath, England.

the SDB. However, future potential platforms include the F-16 Fighting Falcon, B-1 Lancer, B-2 Spirit, F-22 Raptor and F-35 Lightning II.

The SDB has high precision capabilities. It is lightweight and small which means increased aircraft payload. The bomb, a mere 250 pounds, has a smaller lethality radius, but its advanced technology makes the small blast a benefit, not a liability.

“The SDB is a very precise coordinate-seeking weapon,” said Lt. Col. Mark Pierce, deputy chief of the ACC Advanced Weapons Requirements Branch.

“Because of its precision, it doesn’t have to carry a lot of explosive material to achieve weapons effects against the specified target. Therefore... targets can be serviced without the excessive blast and fragmentation of a larger weapon. The result should be less collateral damage.”

Furthermore, its small size enables aircraft to carry more weapons, allowing commanders “to service more targets on a single pass.” Its mounting carriage, the BRU-61/A, fits four bombs on one weapon pylon.

It is also a versatile weapon. The SDB range is more than 50 nautical miles when launched at 40,000 feet at Mach .95. This enables an aircraft to launch SDBs to multiple targets, while beyond the range of many anti-aircraft systems. Additionally, it is an all-weather weapon, effective day or night and can be fired at targets in front of, to the sides, and

behind the employing aircraft. It is effective on stationary targets within 1.2 meters. Typical targets include hardened aircraft bunkers, early-warning radar, stationary SCUD missile launchers, stationary artillery and more, said Colonel Pierce.

Boeing will manufacture more than 24,000 such weapons and 2,000 carriages for the Air Force. The Air Force is investing \$1.2 billion for production, with deliveries planned beyond 2015. ■



News Briefs

Flight Testing of Laser Gunship

Boeing has begun flight testing for the Advanced Tactical Laser (ATL) Advanced Concept Technology Demonstration (ACTD) program and has generated “first light” of ATL’s high-energy chemical laser in ground tests, achieving two key milestones in the laser gunship development effort.

During the “low-power” flight tests, which began Oct. 10 and conclude this fall, the ATL ACTD system will find and track ground targets at White Sands Missile

Range, NM. A low-power, solid-state laser will serve as a surrogate for ATL’s high-power chemical laser. ■

SDB I Focused Lethality Munition Contract Awarded

Boeing recently received the first phase of a \$27 million USAF contract for the Small Diameter Bomb I Focused Lethality Munition (SDB I FLM) Joint Capability Technology Demonstration (JCTD).

FLM is a very low collateral damage variant of the SDB I system that provides a large blast effect with very few metal fragments. It will allow

the warfighter to prosecute targets in confined areas while minimizing the risk of damaging adjacent structures.

Lawrence Livermore National Laboratory and the U.S Air Force Research Laboratory developed the technology for the FLM warhead. Under the JCTD contract, Boeing will incorporate the FLM technology into the SDB I system, perform a series of ground and flight tests, and manufacture a limited number of FLM weapons. ■

Excalibur Closer to Fielding

Raytheon and BAE Systems Bofors’ Excalibur team successfully concluded safety testing of the Excalibur global positioning system-guided 155mm artillery projectile recently. Excalibur is the next-generation family of artillery projectiles.

The Sequential Environmental Test-Safety (SET-S) series of 15 Excalibur projectiles took place in late summer. The program is a cooperative effort between the United States and Sweden.

The success of the SET-S series brings the team closer to the early fielding goal. The next steps prior to fielding to deployed forces early in 2007 are production verification tests, first-article tests and a limited user test.

The Excalibur program currently is responding to an urgent request from the warfighter to accelerate fielding because of the projectile’s better than 10-meter accuracy that is not available from any other artillery projectile. ■

Boeing Completes Avionics Upgrade of B-1

Boeing recently installed the final Block E avionics modification kit on the U.S. Air Force’s active fleet of 67 B-1B Lancer long-range heavy

PEOPLE

Gen. **James T. Conway** became the 34th Commandant of the Marine Corps on Nov. 13, assuming command from Gen. **Michael W. Hagee** who retired after 42 years of military service. Most recently, Conway served as the Director of Operations for the Joint Staff. He commanded the I Marine Expeditionary Force during two combat tours in Iraq. Prior to that he commanded the 1st Marine Division.

Navy Vice Adm. **Patrick M. Walsh** receives his fourth star when he takes over as the Vice Chief of Naval Operations. He is currently serving as Commander, U.S. Naval Forces, Central Command and Commander, Fifth Fleet in Bahrain.

Navy Vice Adm. **Evan M. Chanik, Jr.** is the new Commander, Second Fleet, Norfolk, VA. Previously he served as Director, Force Structure, Resources and Assessment, J-8, Joint Staff. Chanik keynoted PSA’s 2006 Winter Roundtable.

Navy Rear Adm. **James M. Hart** soon will become the new Commander, Combined Joint Task Force, Horn of Africa. He served as a PSA Board Member when he was stationed at the Pentagon in OPNAV and later in OSD.

Navy Rear Adm. **Richard W. Hunt** is being assigned as Director, Surface Warfare Division, N86, OPNAV. Currently, Hunt is serving as Commander, Carrier Strike Group Six. When Hunt was J-5’s Deputy Director for Strategy and Policy, he briefed PSA’s 2004 Winter Roundtable on the National Military Strategy of the United States.

USAF Brig Gen **James P. Hunt**, Deputy Director, Force Application (J-8), Joint Staff, becomes the Director, Air and Space Operations, U.S. Air Forces in Europe. He addressed PSA’s 2005 PEO Forum at Eglin AFB. USAF Brig. Gen. **Gregory A. Feest**, currently serving as the Director for Logistics, Installations & Mission Support at Randolph AFB, TX, will replace Hunt on the Joint Staff.

Navy Rear Adm. (lower half) **Scott H. Swift** is the new Deputy Commander, U.S. Naval Forces, U.S. Central Command, Bahrain. He left OSD where he served as Deputy Executive Officer for Naval Aviation and Tactical Air Systems, Office of the Secretary of Defense and until recently served as a PSA Board Member.

USAF Maj Gen **Stephen M. Goldfein**, Commander, USAF Warfare Center, Air Combat Command, Nellis AFB, NV becomes Vice Commander, ACC, Langley AFB, VA.

bombers, completing a five-year, \$680 million contract for enhanced computer hardware, software and weapons delivery capability.

The installation concluded the third phase of the Conventional Mission Upgrade Program (CMUP) undertaken in 1993 to convert the B-1 from a nuclear to a conventional role. A small number of CMUP-equipped Lancers delivered more tonnage of ordnance while flying fewer sorties than any other aircraft during Operation Iraqi Freedom.

The Block E modification replaces six computers with four, providing a 25-fold increase in throughput, memory and input/output margins

required for conventional weapons capability, defensive systems upgrades and future growth. The package also integrates the Wind-Corrected Munitions Dispenser, the Joint Standoff Weapon and the Joint Air-to-Surface Standoff Missile, substantially augmenting the bomber's standoff capability. ■

BAE Systems Develops Net-centric Targeting System

The National Geospatial-Intelligence Agency has selected BAE Systems to develop a web-based surveillance and targeting system. The system will rapidly identify battlefield targets and other possible threats and greatly speed decision-making by intelligence analysts and military personnel.

NGA awarded BAE Systems a \$47 million contract, including options, to deliver the Global Net-Centric Surveillance and Targeting (GNCST) system. "Gun Coast," as it's commonly called, uses a Web-based interface on a secured computer network to gather real-time data from multiple intelligence sensors and process it into useable data for the military and intelligence communities.

Analysts currently collect data from many different sources and sensors. Processing that data and fusing it into useful information can take considerable resources and time. Through the use of complex algorithms, GNCST can dramatically reduce the workload and time needed to put vital pieces of information together. ■

FLM Under Development

Boeing was recently awarded a \$9.5 million USAF contract to develop a Focused Lethality Munition. The Joint Capabilities

Technology Demonstration contract was approved by OSD to demonstrate the military utility of a low collateral damage warhead comprised of a composite case and multi-phase blast explosive fill integrated onto a Small Diameter Bomb I weapon. This effort is for integrating and testing the new warhead onto the SDB I weapon. ■

JSOW Block II Variant First Flight

Raytheon's Joint Standoff Weapon (JSOW) Block II, an updated version of the battle-proven weapon that offers significantly lower unit costs and an additional payload option, successfully flew its first U.S. Navy test flight Oct. 12.

The test, flown at China Lake Naval Air Station, CA, on an F/A-18, demonstrated both weapon system performance and aircraft compatibility.

Raytheon is under contract with Naval Air Systems Command to produce Block II JSOW-C missiles for the Navy and Marine Corps starting in 2007. Block II has significantly reduced unit cost through airframe redesign to a major single piece, employment of less expensive components, advanced technology and a reduction in parts count and special mission aircraft. ■

Controlling HURT

Northrop Grumman has successfully demonstrated a low-cost, tasking and control system for unmanned systems that can deliver video information about enemy positions to U.S. military forces in urban battle zones.

The system, called "HURT," controls a network of small, low-flying drones to send video images in real time to individual warfighters with handheld computers. Military forces

CALENDAR OF EVENTS

Precision Strike Winter Roundtable

Date: February 1, 2007

Theme: "Precision Engagement—Strategic Context for the Long War"

Location: Crystal Forum—Crystal City Marriott, Arlington VA

Precision Strike Annual Programs Review

Date: April 24-25, 2007

Theme: "Precision Engagement—Adapting Technology to Meet Emerging Warfighters Needs"

Location: Waterford Receptions of Springfield—Springfield, VA

Precision Strike Summer Forum

Date: July 2007

Location: Virginia Beach, VA

Precision Strike Technology Symposium

(To be conducted at the SECRET/NOFORN level)

Date: October 23-25, 2007

Location: The Johns Hopkins University Applied Physics Laboratory-Kossiakoff Center, Laurel, MD

*Call for Papers will be released in January 2007

Sponsorship and exhibit opportunities available, more information can be found at www.precisionstrike.org

in urban warfare situations currently have no direct access to real-time surveillance data. HURT stands for heterogeneous urban RSTA (reconnaissance, surveillance and target acquisition) team.

HURT allows ground forces to view surveillance images of the surrounding area and request specific information about a suspected enemy position on a user-friendly touch screen. The system autonomously prioritizes multiple requests and directs the most suitable UAVs to the required locations to achieve a closer look. ■

Wireless Precision Assault Missiles

Raytheon has received a contract with five one-year options that has an initial value of \$163.2 million to provide heavy anti-tank, precision assault missiles for the U.S. military.

Under this contract, Raytheon will deliver the new wireless version of TOW missiles that receives commands from the gunner through a wireless data link, eliminating the wire connection that the system has used since it was introduced more than 30 years ago.

Because the wireless system is built into the missile and the missile case, wireless TOW works with existing launch platforms – including the Improved Target Acquisition System, Improved Bradley Acquisition Subsystem, TOW 2 Subsystem and M220 Ground TOW. The system performs exactly as the wire-guided version, enabling soldiers to continue using the proven weapon without changing tactics or incurring additional training.

TOW remains the Army and Marine Corps' primary heavy anti-tank and precision assault weapon.

Meanwhile, Raytheon has been awarded a \$285.4 million contract

to produce and deliver Improved Target Acquisition Systems (ITAS) to the Army and the Marine Corps. The five-year contract from the U.S. Army Aviation and Missile Command in Huntsville, AL continues Army procurement of the systems and marks the start of the U.S. Marine Corps system acquisition. The Army procured 709 ITAS units from 1999 through 2004.

ITAS is the advanced Electro-Optic Target Acquisition Fire Control System. It guides the TOW (Tube-Launched, Optically Tracked, Wire-Guided) weapon systems to their targets with surgical precision. ■

Successful Joint/Allied NEC 'Cursor on Target' Trials

QinetiQ, acting as consortium lead, has successfully conducted the Cursor on Target (CoT) project, a demonstration of network enabled tactical communications between different friendly forces, in a joint networked air-land (NAiL) environment.

This Network Enabled Capability (NEC) demonstration was commissioned by the MoD Capability Manager (Information Superiority), managed by the MoD Air Command and Control Systems (ACCS) IPT and supported by the U.S. National Reconnaissance Office.

The exercise took place on military ranges managed by QinetiQ for the MoD. Not only was a step change increase in in-flight aircrew situational awareness achieved but aircrews also believe that the much improved battlespace situational awareness will reduce exposure to hostile air defenses. ■

MALD Testing Underway

Raytheon ADM-160B Miniature Air Launched Decoy (MALD) vehi-

cles recently demonstrated successful separation performance when launched from a U.S. Air Force F-16 aircraft.

The flight tests took place at Eglin AFB, FL, under a development contract managed by the 728th Armament Systems Group.

Nine free-flight launches took place from May to July during the Eglin 46th Test Wing sorties. Each sortie involved the launch of MALD vehicles at varying speeds, altitudes and F-16 pylon locations.

Three of the nine MALDs were equipped with specialized telemetry instrumentation to gather trajectory information, and all were photographed by chase aircraft with on-board cameras. The launches were safe, stable and demonstrated successful MALD separation at extreme points of the F-16. ■

Mid Range Munition Projectile Scores a Direct Hit

Raytheon successfully conducted the first beyond line of sight mission with a test firing of its Mid Range Munition Chemical Energy (MRM-CE) guided projectile with digital semi active laser sensor. The projectile, fired from an Abrams M1A2 SEP (system enhancement program) tank, scored an extended-range, guided direct hit.

The test firing demonstrated the laser-guided seeker's ability to successfully target, acquire and track a moving tank and guide the munition to intercept at a distance of 5.4 miles (8.7 km).

The MRM-CE, which will autonomously attack battlefield targets at beyond line of sight ranges, with or without external laser target designation, is a key component of the Army's Future Combat Systems vehicles. ■

Schedule at a Glance

WINTER ROUNDTABLE 2007

1 FEBRUARY 2007

CRYSTAL FORUM – MARRIOTT CRYSTAL CITY – ARLINGTON, VA

Precision Engagement–Strategic Context for the Long War

— Roundtable Highlights —

New Congress-Implications for National Defense Policy

Senator/Congressional Representative Perspectives

Chief of Naval Operations Keynote Address

Congressional Staff Members Priorities & Issues Panel

Joint Strategy Review

Long Range Strike Weapons

William J. Perry Award Ceremony

Joint Experimentation for Precision Engagement

Weapons Technology Blueprint for the Future

(High Speed Weapons, Deep Penetration, and Sensor-to-Shooter Technologies)

Advanced Technology Warfighting Initiatives

ANNUAL PROGRAMS REVIEW 2007

24-25 APRIL 2007

WATERFORD RECEPTIONS OF SPRINGFIELD - SPRINGFIELD, VA

Precision Engagement–Adapting Technology to

Meet Emerging Warfighter Needs

— Review Highlights —

Joint Critical Initiatives for Precision Engagement

Services Technical Sessions-Dominant Maneuvers, Sea Strike, Joint Deep Strike

International Programs Session

Acquisition & Technology–The New Vision

Business Transformation–Strategic Plans & Initiatives

Reliability & Sustainability of Weapons Systems

Current Joint Combat Operations in Afghanistan & Iraq–NATO’s Role & IEDs

C4ISR Real Time Tools for War

Non-Lethal Weapons Capability Roadmap

Streamlined Acquisition Process to meet Emerging Warfighter Needs

Portfolio Systems Acquisition Role in New Acquisition & Technology Structure

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