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## **MORS Special Meeting**

**DoD Force Structure Analysis Way Ahead**

**January 24-27, 2011**

**Chantilly, VA**

# Report Documentation Page

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# MORS Special Meeting: DoD Force Structure Analysis Way Ahead, 24-27 January 2011, Chantilly, VA

COL Pete With, Joint Staff J8, [peter.with@js.pentagon.mil](mailto:peter.with@js.pentagon.mil); Dr. Jim Stevens, OSD CAPE JDS, [james.stevens@osd.mil](mailto:james.stevens@osd.mil)

Secretary Gates has observed, “The United States cannot expect to eliminate national security risks through higher defense budgets, to do everything and buy everything. The Department of Defense must set priorities and consider inescapable tradeoffs and opportunity costs.”<sup>1</sup> In addition, Ms Christine Fox, Director, Cost Assessment and Program Evaluation (CAPE), in her remarks in the plenary session at the MORS Analytic Agenda Way Ahead Workshop last March, emphasized the importance of force structure and risk analyses and further remarked that our current methods and tools are not suited to the analyses needed to support senior leader force sizing and shaping discussions.

The DoD Force Structure Way Ahead Workshop will explore how the analytic community can best identify and assess force structure elements needed to achieve the national security objectives called for in current national security documents. The workshop objective is to review how the analysis community can help the Department answer two questions:

1. Are we building the right force?
2. Are we building the force right?

In other words, we believe that for the next several years, our most significant analysis community challenge is to assist the senior leadership determine what force the nation requires today and how that force should change into the future. Numerous documents and studies guide our efforts:

- The Quadrennial Defense Review (QDR) and the Defense Planning and Programming Guidance (DPPG)

require the Department of Defense to balance resources and risk among four priority objectives: prevail in today’s wars, prevent and deter conflict, prepare to defeat adversaries and succeed in a wide range of contingencies, and preserve and enhance the All-Volunteer Force.

- The Defense Planning and Programming Guidance (DPPG) contains a set of new scenarios for assessing the ability of U.S. armed forces to conduct a broad range of overlapping operations in disparate theaters in overlapping time frames.
- Finally, the Joint Staff, at the direction of SecDef, conducted the Operational Availability Study 2010 (OA-10) to examine the availability of forces in the near- to mid-term. This study provided valuable insights into the constraints on currently stressed forces

The DPPG notes that both external and internal trends will place pressure on the resources available for defense. Looking forward, expected reductions to the Overseas Contingency Operations (OCO) budgets and a return to more normal resourcing levels will require a comprehensive examination of our force structure to ensure the programmed force meets the demands of the national security strategy. As a part of this, the analysis community will need to provide insights to senior decision makers on how well the joint-force-after-next will achieve our strategy.

The Force Structure Workshop will explore the methods we use to collect the proper data, establish metrics, examine the tools used to develop force structure as well as assess how well the force structure meets the national security

objectives in the near-, mid-, and long-terms. This workshop will describe a way ahead for force structure analysis by:

1. Expanding the understanding of force structure analysis data, assumptions, procedures, and applications for the force structure analysis community and customers.
2. Developing insights for improving force structure data, processes, tools, analysis, and products.

The meeting will start on Monday morning with tutorial presentations. The tutorial sessions will provide workshop attendees with background on Department guidance for force sizing, shaping, and capability development and on the existing data, methods, and analysis we use to generate and manage the current force as well as size, shape, and develop the future force. Tutorial presentations include:

1. Data, Methods, and Analysis for Current- and Near-Term Force Planning and Management (Joint Staff, Services, and SOCOM)
2. Guidance for Force Sizing, Shaping, and Development (OSD Policy)
3. Data, Methods, and Analysis for Mid- to Long-Term Force Sizing, Shaping, and Development (CAPE, Joint Staff, Services, and SOCOM)

Following a plenary session on Tuesday morning to set the stage for the workshop, five working groups will engage for 2 ½ days to explore key topics and

*see **Special Meeting** on page 5...*

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## President's Letter

Terry McKearney, MORS President, [terry.mckearney@therangergroup.com](mailto:terry.mckearney@therangergroup.com)

### Fellow MORSians,

From long lines in our airports, to the integrity of our borders, to the ongoing conflict in the harsh “Kush” of Afghanistan, it is clear that our community is continually challenged in our efforts to support the decision makers charged with keeping our nation safe. It's critical that our Society focus on new analytic techniques involving disciplines new to the MORS community, applied to new problems that our community is being called on to address. Our efforts over the past few months have done just that, and I'm pleased that we've provided so many of our members with the opportunity to learn and reflect on the changing nature of operations research and analysis.

Our mini-symposium on the implication of analysis for the social sciences in complex operations in October at George Mason University, chaired by **Dr. Yuna Wong** with the support of **Dr. Bob Sheldon, FS**, typifies the type of event our Society needs to use to expand the definition of operations analysis and research. This mini-symposium was a lively exchange of ideas and experiences between DoD anthropologists, military planners, operations analysts, and academics, focused on the difficulties of assessing the progress of irregular warfare and Phase 5 operations. In November, we shifted the emphasis to our own shores with our special meeting on optimizing investments in critical infrastructure, chaired by **Mr. Michael Samsa**. This busy three-day event used four separate working groups to explore the tough questions concerning the costs of protecting our infrastructure. It was clear

that our nation faces tough choices in meeting the challenge of protecting our key infrastructure and resources. This special meeting heightened the value of our professional skill as analysts in making these tough choices.

As we've moved forward in addressing new themes in analysis, we've been careful to remember that the key to the sound application of analytic techniques is the skill and creativity of the individual ana-

**While the challenges facing the analytic community in addressing the security needs of our nation and its allies are many and evolving, I'm convinced that the sort of activities our Society has committed itself to are essential to our meeting them. Through participation in MORS, our professional skills are enhanced and our awareness of relevant issues is sharpened.**

lyst. Addressing the needs of our analysis community through our members is a core mission of our Society and the essence of our theme this year, “Developing the Next Generation of National Security Analyst.” Several initiatives have been instrumental in advancing the Society's support of this emphasis. Tutorials conducted in conjunction with the meetings described above have provided attendees with new information and skills for application in their professional pursuits. In an effort to focus on our younger analysts, **COL Chris Hill** conducted a Young Analyst Focus Group in October, providing our Society's leadership with valuable insight into the needs of that next generation of analyst. On December 7th, we will be hosting a full-day member event that will feature a Leadership Forum in the morning, where our Sponsors will

address their priorities and topics of concern to the membership. In the afternoon, we'll host a “career symposium” to help members locate new job opportunities.

While the challenges facing the analytic community in addressing the security needs of our nation and its allies are many and evolving, I'm convinced that the sort of activities our Society has committed itself to are essential to our meeting them. Through participation in MORS, our professional skills are enhanced and our awareness of relevant issues is sharpened. Next year will bring many opportunities for involvement in the Society, from our special meetings, to the Education Colloquium, to our summer Symposium. I urge you to get involved in the Society and our work; you'll find it personally and professionally rewarding!

In closing, I want to congratulate **Greg Parlier** as he assumes the presidency of the INFORMS Military Applications Society (MAS), our MORS sister organization and partner in serving the national security analyst community. Greg is no stranger to either organization and is well known within the community. At the same time, I need to recognize and thank outgoing MAS president **Pat Driscoll** for his service to both our organizations. Though his vision we have formed a closer relationship between MORS and MAS, one that benefits our memberships and the practice of operations research. Thanks, Pat! I look forward to still seeing you at our events!



# MAS President's Comments

Greg H. Parlier; [gparlier@knology.net](mailto:gparlier@knology.net)

Thanks to all who attended our recent annual INFORMS Conference in Austin this past November. The MAS cluster of sessions and presentations remains one of our key contributions and collaborative opportunities as a professional society, so thanks to our 20 session chairs for their coordinating efforts and to our 70 presenters who addressed a wide range of military, defense, and security related challenges and issues. We offer a special thanks to **George Mayernik**, our MAS Industry Liaison, for his marketing contributions and continued success soliciting corporate donations to offset conference costs.

A special privilege – and always a highlight during our business meeting – was recognizing the recipients of the prestigious awards presented by MAS. These awards are presented in three general categories representing future potential, recent achievement, and long-term contributions to military operations research. This year's nomination slates were truly impressive in both quality and quantity. From a strong field of 15 nominations, University of Buffalo OR PhD student **David J. Myers** was selected for the Seth Bonder Scholarship, a \$4000 grant to a promising young doctoral researcher. The Koopman Prize, a \$500 award for the best published paper or report on military operations research, honors the memory of Bernard Koopman (1900-1981), a pioneer in operations research. The 2010 Koopman Prize was awarded to **Roberto Szechtman** and Moshe Kress for their paper "Why Defeating Insurgencies is Hard: The Effect of Intelligence in Counterinsurgency Operations – A Best-Case Scenario". And the J. Steinhardt Prize, sponsored by the Center for Naval Analyses (CNA), is awarded for outstanding contributions to military operations research for lifetime achievement rather than for a specific contribution. This year's selection committee, composed of previous Steinhardt Prize recipients, bestowed this distinctive honor upon two Naval Postgraduate School (NPS) professors, **Alan R. Washburn** and **Wayne P. Hughes, Jr.** Our sincere congratulations to each winner and our thanks

to all award contenders for the significant achievements which earned their nominations. Also, we offer a special thanks to MAS past-President **Ed Pohl** for his diligence and perseverance organizing the entire award process and guiding our selection committees.

We also recognized newly elected MAS council member Army Lieutenant Colonel **Doug Matty**, currently a student at the Army War College, and Vice-President/President-elect **Bill Fox**, professor in the NPS Defense Analysis department. Congratulations are also in order for MAS council rep **Bill Klimack** who was elected to serve as INFORMS Vice President for Meetings.

We plan to continue with our annual Spring MAS Conferences this coming year, again in Huntsville, and have tentatively agreed with the Military Operations Research Society (MORS) to jointly sponsor the conference during the last week of March. Additional near-term opportunities to showcase analytical contributions include the mid-April INFORMS "Practice" Conference in Chicago, now relabeled as the "INFORMS Conference on Business Analytics and Operations Research", and the International Federation of Operational Research Societies (IFORS) in Melbourne, Australia in mid-July. Please contact us if you wish to participate in program development, chairing a session, and/or presenting your work.

On a more personal note, I was fortunate to recently serve in an advisory capacity with US Forces in Iraq – "Veni, Vidi, Duci." Although my official duties were primarily focused on counter-IED efforts, I am truly grateful for the considerable time I was able to spend with many of our superb combat analysts at "the point of the spear." As you would expect, they are performing valiantly across a range of activities and echelons of command. Nonetheless, I came away from this experience convinced that there is much more that could be achieved if we can resurrect and reinforce "traditional" OR and apply it to these crucial operational challenges. Despite our incredible advantage in global military power, we face enormous strategic

resource challenges on a perilous cusp of history. Current trends within our federal budget, in both discretionary and "entitlement" programs, render spending trajectories unsustainable and future programs unachievable. Even within DoD, our Secretary of Defense has observed that the recent "gusher of spending" must now be replaced with a "culture of savings and restraint."

These operational and strategic conditions provide fertile ground to harness and apply the "Power of Analysis" – operations research, transformational strategic planning, and innovative management concepts – to many of our persistent, seemingly intractable national security challenges. The potential for improvement appears to be as dramatic as it is necessary. Furthermore, as a professional society fully cognizant of the multi-disciplinary capabilities that defined traditional OR's problem-solving approach, we can provide a unique, enabling role by serving as a "connecting bridge" to link expertise and encourage collaboration across the many operational, technical, educational, scientific, and analytical communities represented within our membership. Of course, the challenge remains: How best can we serve this purpose?

Finally, and most importantly, on behalf of our entire society and fellow MAS council members, a heartfelt salute and sincere thanks to **Pat Driscoll** for his outstanding leadership as MAS President these past two years. Pat continually worked hard to improve both our MAS value proposition and contributions to the profession. Recognizing excellent OR students in our service academies, helping to make our website both useful and user-friendly, increasing our membership while also supporting newly established chapters, formalizing our annual MAS conference, and securing a more collaborative, productive, and complementary relationship with MORS are just a few of his countless contributions. Pat set the bar high and generated great momentum – our challenge now is to sustain and reinforce all that he has imparted. So, from us all: "Thanks again, Pat!"



# MORS Education and Professional Development (EPD) Colloquium, March 2011

COL Simon Goerger, OSD (P&R), [Simon.Goerger@us.army.mil](mailto:Simon.Goerger@us.army.mil)

Mark your calendars to attend the MORS 2011 Education and Professional Development (EPD) Colloquium in March 2011; either as a student participant, a presenter, or an active listener. This year's MORS EPD Colloquium will be held 8-10 March 2011 at the Virginia Military Institute, Lexington, Virginia. The theme is "Meeting National Security Challenges through OR!" In addition to the quick-turn analysis student competition, we will have several speakers talking on how Operations Research is being used and applied throughout DoD and Homeland Security to address security issues.

Last year, the Education Colloquium attracted undergraduate and graduate

students from twelve academic institutions to include not only the academies (USMA, UAFA, USNA, and USCGA), but The Citadel, Georgia Institute of Technology, NPS, AFIT, George Mason University, VMI, Virginia State University and the US Army Logistics University. This year we plan to attract an even larger student population from non-military universities and colleges in the greater Virginia, Maryland and West Virginia area. If you have a contact at a college anywhere in the greater Lexington area, please contact Simon Goerger ([Simon.Goerger@us.army.mil](mailto:Simon.Goerger@us.army.mil)) for additional information on how they might participate.

The Education Colloquium provides an excellent opportunity for those from the

academic, DoD, and corporate worlds to meet and share current research significant to national defense. The academic attendees are always in search of current topics for student projects and the students continually impress MORSians with their knowledge and insights.

The schedule of speakers and events is still under development. If you would like to assist in EPD planning and coordination, planning or execution of the student competition, or have a worthwhile topic for discussion, please contact Simon Goerger.

This year marks the first time EPD will be hosted by VMI. We look forward to this historic venue for this exciting MORS event.

### *Special Meeting continued from page 1...*

formulate insights that will be useful to senior-level government and military decision makers. The working groups and a partial list of topics to be addressed include:

#### **WG1: Near Term Force Structure**

**Analysis** – will examine how the Department currently analyzes force structure processes, data, tools, and assumptions in the near-term (next 5 years). To better understand these implications the working group will consider past force structure employment and current operations.

**WG2: Personnel** – will examine how total force requirements for manpower and personnel are analyzed and explore how these methods capture explicit and implicit of the Total Defense Workforce requirements (size and mix) as outlined in the QDR.

**WG3: Materiel and Acquisition** – will examine the current process used by the Department to identify material capability gaps. The WG will also look at

the processes used to fill materials gaps, such as: increasing the stock of existing equipment, modification of existing equipment, purchasing already available commercially available equipment, and investment in "new" solutions.

**WG4: Linking Near-Term to Future Force Structure Analysis** – will explore alternative approaches for optimizing force structure to meet near-term requirements while establishing a trajectory to future force structure requirements. The desired outcome is a recommended analytical framework addressing weaknesses in the current force structure analysis approaches and suggestions for improvements.

**WG5: Analytic Tools for Force Structure Analysis** – As Secretary Gates stated in his January 2009 Foreign Affairs article, "the United States needs a military whose ability to kick down the door is matched by its ability to clean up the mess and even rebuild the house afterward." Simply stated, the analysis com-

munity must develop tools and methods to support force structure sizing and shaping discussions for pre-surge, surge, and post-surge operations. This working group will explore the methodologies, analytic tools, models, and simulations used by the Department to evaluate force sufficiency and proficiency, including hybrid, cyber and irregular warfare, for all operational phases of conflict.

The classified workshop, held at the TASC Heritage Conference Center, Chantilly, VA from January 24-27, 2011 will conclude with working group outbriefs on Thursday afternoon. If you would like to help, contribute or have questions please contact the Program Chairs: COL Pete With, Joint Staff J8, at [peter.with@js.pentagon.mil](mailto:peter.with@js.pentagon.mil) or Dr Jim Stevens, OSD CAPE JDS, at [james.stevens@osd.mil](mailto:james.stevens@osd.mil).

<sup>1</sup>Gates, Robert M., 2009, A Balanced Strategy: Reprogramming The Pentagon For A New Age, Foreign Affairs, January/February 2009



# Evolving to Support the Next Generation of National Security Analysts

John R. Hummel, 79th Program Chair, [jhummel@anl.gov](mailto:jhummel@anl.gov)

The 79th MORS symposium at the Naval Postgraduate School 20 – 23 June 2011 will mark a significant milestone for the Society. The 79th MORSS will be the first symposium to involve a full four day schedule. In the past, Monday was devoted to registration, tutorials, and the Rist Prize judging. Starting with the 79th symposium, additional events will occur on Monday including Special Sessions and the Working Group/Composite Group kickoff event.

The overall structure of the symposium is being modified to open up more time-slots for working group presentations. In conjunction with this, a greater emphasis will be made on providing sessions for poster presentations as well as for those abstracts that cannot be accommodated within the Working Group or Composite Group schedules. Together these two changes will enable the symposium to provide more opportunities for the

increasing number of submissions that have been received over the years.

As discussed in the article by Tom Denesia, the 79th Working Group/Composite Group Coordinator, the structure of the Working and Composite groups has undergone a change from that used during the 78th MORSS. This change completes a two-year effort to comprehensively review and update the MORS Working Group and Composite Group structure and will provide the society with a broader portfolio of analysis disciplines and topics to consider.

The 79th MORSS will be offering another strong Special Sessions program. The article by Don Timian, the 79th Special Sessions Coordinator, describes the Special Sessions program planned for the 79th MORSS.

The 78th MORSS had a strong offering of demonstrations and posters. We are planning on continuing that program

in the 79th. Dan Dassow is coordinating this effort again this year and has an article in this issue describing the plans. A number of social activities are also planned for the 79th MORSS, which also corresponds with the Society's 45th birthday. Monday night will be the New Members Social and Tuesday night will be the Mixer for all attendees. Wednesday will be the signature social event for the Symposium – dinner at the Monterey Bay Aquarium. Attendees will have “after hours” access to the exhibits, including some activities that do not occur during regular visiting hours.

We will be holding our 3rd MORS 5 km run on Thursday morning. The 5 km run, whose proceeds support the MORS educational programs, will have a beach front course just off the NPS grounds. Kelly Cormican is coordinating the 5 km run and if anyone is interested in working with him on this, please contact him at [KCormican@wbbinc.com](mailto:KCormican@wbbinc.com).

## 2011 MORS Awards and MORS Prizes

Being recognized by your boss is always a terrific thing. Hopefully there is a raise, some new perk, or maybe even cake. Another opportunity for recognition is a MORS award or prize. Annually MORS bestows its top honors upon the most deserving recipients in recognition of their service to the society and their analytic contributions to the field of national security operations research. The 2010 Award winners are listed in the September 2010 edition of *Phalanx* or online at <http://www.mors.org/heritage/pandaa.aspx>.

MORS presents five awards: the **Clayton J. Thomas Award**, the **Vance R. Wanner Memorial Award**, the **Wayne P. Hughes Junior Analyst Award**, the **John K. Walker, Jr. Award**, and the **MOR Journal Award**. Some of these awards require nominations, while others are determined through continued excellence or a journal article which stands apart with distinction.

The **Clayton J. Thomas Award** is an annual award that recognizes an individual that has, through their involvement in the field of military operations research, exhibited sustained outstanding performance, shared their knowledge and talents to others in the field, and provided technically sound options to defense decision makers.

The **Vance R. Wanner Memorial Award** recognizes a military operations research professional who has played a major role in strengthening the profession. Winners have distinguished service over time to the profession of military operations research and demonstrated sustained excellence as a leader and a manager in the conduct of military operations research, resulting in important contributions to national security.

The **Wayne P. Hughes Junior Analyst Award** is a relatively new award, first

awarded in 2007. This particular award is a great way to recognize a new operations research analyst and enhance their resume. The 2010 Hughes Nominations for the Thomas, Wanner and Hughes awards are requested to be submitted by 1 April 2011.

The **John K. Walker, Jr. Award** acknowledges the author(s) of the best technical article published in *PHALANX*, *The Bulletin of Military Operations Research*, during the previous calendar year.

The **MOR Journal Award** recognizes the authors of the best article in the journal *Military Operations Research*. No nominations are required for the Walker or MOR Journal awards, just keep submitting the outstanding papers to *Phalanx* and to *Military Operations Research*.

In addition to the five prestigious MORS awards discussed above, the Society also



## 79TH MORS SYMPOSIUM

presents two highly coveted prizes annually: The Rist Prize and The Barchi Prize.

**The Rist Prize** is given to recognize outstanding analytical studies leading to important implemented applications. The award's criteria include originality and ingenuity, as well as the importance of the problem and the impact of the solution. Nominations are solicited from U.S. Government agencies or contractors and must include a three-page abstract and a letter from a senior (i.e., flag level, Senior Executive Service, or private sector equivalent) Government/Industry official documenting the value of the implemented solution. Finalists will be judged by a panel of MORS Fellows and Sponsors at the 79th MORS Symposium at the Naval Post Graduate School, Monterey, California. A cash award will be given to the first and second prize winners. Nominations are due 14 January 2011. The first place winner will also give an encore presentation at the 79th MORSS

**The Barchi Prize** is presented to recognize the best paper presented at the 78th MORSS. It rewards methodological

advances as well as groundbreaking applications. Each 78th MORSS Working Group, Composite Group, and Special Session Chair was asked to nominate candidates for this year's award. Nominees have been notified and asked to submit a full paper by the 30 December 2010 deadline. The papers will be judged by a panel comprised of MORS Board Members and outside experts. The winner(s) will be announced at the 79th MORSS in Monterey and will give an encore presentation of his/her/their work during the Symposium.

With all the great analysts in our organizations and the tremendous work they are doing in support of Homeland Defense and National Security, we are expecting and hoping for dozens of nominations/applications for these awards and prizes. While this makes extra work for the Awards and Prize Committees, we look forward to reviewing and recognizing the exceptional accomplishments of our friends and colleagues. Recognition of our colleagues requires members of MORS to take time and effort to contemplate and compose a nomination/

application for what people have done recently and over the course of their professional careers. When one of your friends, co-workers, MORS acquaintances or mentors is acknowledged as attaining a milestone, it should warm your heart. This is a wonderful opportunity for a co-worker or a supervisor to forward one of their outstanding analysts for recognition or for anyone of us to thank our mentors by submitting them.

More information can be found on MORS Awards and MORS Prizes at the MORS web site ([www.mors.org](http://www.mors.org)). Click on the folder labeled 'Our Heritage' and follow to the 'Prizes and Awards' sub-folder. If you have MORS Awards questions that need a more personal touch, please contact Dr. Dave Spoerl ([drspoerl@gmail.com](mailto:drspoerl@gmail.com)). If you have MORS Prize questions that need a more personal touch, please contact Dr. Jerry Diaz ([jerry.diaz@hsidhs.gov](mailto:jerry.diaz@hsidhs.gov)). You may also contact Mr. Eric Hamp ([eric@mors.org](mailto:eric@mors.org)) of the MORS office for information about MORS Awards or MORS Prizes.

## Special Sessions

*Don Timian, Army Test and Evaluation Command, [donald.timian@us.army.mil](mailto:donald.timian@us.army.mil)*

For the 79th MORS Symposium – “Developing the Next Generation of National Security Analysts” – we’re (somewhat) breaking the mold with respect to when Special Sessions are scheduled. Instead of Special Sessions being restricted to the “SOP” 1530-1700, Tuesday thru Thursday time-slot, as shown below, the MORS Heritage; Sponsor’s Hot Topic; and the Army, Navy, Air Force, Homeland Security, Joint Staff, and Office of the Secretary of Defense Special Sessions time-slots have been moved.

### Monday, 20 June 2011

MORS Heritage Session (1530-1700)

### Tuesday, 21 June 2011

Sponsor’s Hot Topics (1330-1500)

Strategist’s Corner (1530-1700)

Prize Paper Session – Rist and Barchi Prize Presentations (1530-1700)

Information Operations (1530-1700)

### Wednesday, 22 June 2011

Army Special Session (0830-1000)

Navy Special Session (1030-1200)

Homeland Security Special Session (1330-1500)

Deployed Analyst (1530-1700)

Climate and Energy Imperatives for Future Naval Forces; Navy, Marine Corps, and Coast Guard (1530-1700)

Junior/Senior Analyst Special Session (1530-1700)

Director of National Intelligence (1530-1700)

### Thursday, 23 June 2011

Air Force Special Session (0830-1000)

Joint Staff Special Session (1030-1200)

Office of Secretary of Defense Special Session (1330-1500)

TBD (1530-1700)

While not new to the Special Session agenda, the Deployed Analyst Special Session – Wednesday, 22 June, 1530-1700

– will be chaired by Ms. Jane Krolewski and will feature a recently-deployed analyst from each Service presenting a short paper on the analysis efforts he/she did in Theater and what tools were used along with the insights, recommendations, and/or feedback given to the Senior Leaders supported and, if recommendations were implemented, what was the result.

As you can see, on Tuesday, 21 June (1530-1700), Dr. Ann Willis of the Director of National Intelligence Office, like last year at Quantico, will be chairing a Special Session and Dr. Dean Simmons from the Johns Hopkins Applied Physics Lab will again be chairing a Climate and Energy Special Session. We still have a few open slots, so if there’s a topic that you feel is relevant to our National Security Analytic Community and would be interested in chairing a Special Session at the Naval Post Graduate School, please feel free to contact me ([donald.timian@us.army.mil](mailto:donald.timian@us.army.mil)) or my Co-Chair Dave Spoerl ([drspoerl@gmail.com](mailto:drspoerl@gmail.com)). See you in Monterey!



# 79TH MORS SYMPOSIUM

## Sailing to Monterey

Tom Denesia, NORAD-USNORTHCOM  
J84 Analysis Division, thomas.denesia@northcom.mil

## 79<sup>th</sup> MORSS



MONTEREY, CA 20-23 JUNE 2011  
Developing the Next Generation of National Security Analysts

The preparations for the 79th MORSS are well underway. The theme of the symposium is “Developing the Next Generation of National Security Analysts” and it will be held at the Naval Postgraduate School in Monterey, California. The success of every symposium depends upon the members who participate with presentations, attendance, and dialogue, and the Working Group (WG)/Composite Group (CG) Chairs who bring it together. We welcome all of you back and look forward to your new discoveries and continued research. Remember, it’s never too early to start thinking about presentations for the symposium. Presentations can cover work in progress or already completed. Please contact the list of new and returning Chairs on the MORS website ([http://www.mors.org/events/79th\\_morss.aspx](http://www.mors.org/events/79th_morss.aspx)) for more information on their plans.

The 79th MORS Symposium staff has been hard at work reviewing the currency and relevancy of our Working and Composite Groups. Taking many inputs into consideration, we have made a number of revisions to the WG/CG lineup and have expanded the symposium to a full four days – from Monday, 20 June 2011, through Thursday, 23 June 2011.

A major change to the structure is the establishment of a new Composite Group (Hybrid Warfare, CG-G) that completes a two-year effort to comprehensively review and update the MORS Working Group / Composite Group structure. This new CG includes a number of old Working Groups, as well as a new one on Computational

	New WG # 79th		Former WG # 78th
<b>CG-A</b>		<b>Homeland and International Operations</b>	
	<b>WG-1</b>	Strategic Operations	WG-1
	<b>WG-2</b>	Chemical, Biological, Radiological and Nuclear (CBRN) Defense	WG-2
	<b>WG-3</b>	Non-Proliferation, Threat Assessment and Threat Reduction	WG-3
	<b>WG-4</b>	Infrastructure Analysis, Protection and Recovery	WG-4
	<b>WG-5</b>	Homeland Security, Homeland Defense and Civil Support	WG-5
<b>CG-B</b>		<b>C4ISR and Net-Centric Operations</b>	
	<b>WG-6</b>	Battle Management Command and Control	WG-6
	<b>WG-7</b>	ISR and Intelligence	WG-7
	<b>WG-8</b>	Space Acquisition, Testing and Operations	WG-9
<b>CG-C</b>		<b>Joint Warfare</b>	
	<b>WG-9</b>	Air and Missile Defense	WG-10
	<b>WG-10</b>	Joint Campaign Analysis	WG-11
	<b>WG-11</b>	Land and Expeditionary Warfare	WG-12
	<b>WG-12</b>	Maritime Operations	WG-13
	<b>WG-13</b>	Strike Warfare and Power Projection	WG-14
	<b>WG-14</b>	Air Warfare	WG-15
<b>CG-D</b>		<b>Resources/Readiness/Training</b>	
	<b>WG-15</b>	Casualty Estimation and Force Health Protection	WG-17
	<b>WG-16</b>	Strategic Deployment and Distribution	WG-18
	<b>WG-17</b>	Logistics, Reliability and Maintainability	WG-19
	<b>WG-18</b>	Manpower and Personnel	WG-20
	<b>WG-19</b>	Readiness	WG-21
	<b>WG-20</b>	Analytic Support to Training	WG-22
<b>CG-E</b>		<b>Acquisition</b>	
	<b>WG-21</b>	Experimentation	WG-23
	<b>WG-22</b>	Measures of Merit	WG-24
	<b>WG-23</b>	Test and Evaluation (T&E)	WG-25
	<b>WG-24</b>	Analysis of Alternatives	WG-26
	<b>WG-25</b>	Cost Analysis	WG-27
	<b>WG-26</b>	Decision Analysis	WG-26
<b>CG-F</b>		<b>Interdisciplinary Advances in OR</b>	
	<b>WG-27</b>	Modeling and Simulation	WG-29
	<b>WG-28</b>	Operational Environments	WG-30
	<b>WG-29</b>	Computational Advances in OR	WG-31
	<b>WG-30</b>	Wargaming	WG-33
<b>CG-G</b>		<b>Hybrid Warfare</b>	
	<b>WG-31</b>	Information and Cyber Operations	WG-8
	<b>WG-32</b>	Special Operations and Irregular Warfare	WG-16
	<b>WG-33</b>	Social Science Methods and Applications	WG-32
	<b>WG-34</b>	Computational Social Sciences	FS-2
		<b>FOCUS SESSIONS</b>	
	<b>FS-1</b>	National Security Risk Management	
	<b>FS-2</b>	Red-Blue Teaming	
		<b>Distributed Working Groups</b>	
	<b>DWG-1</b>	Human Behavior and Performance	



## 79TH MORS SYMPOSIUM

Social Sciences. This new Working Group started as a Focus Session in the 78th MORSS and was transitioned to a Working Group for the 79th MORSS. As you can see from the table below, several other Working Groups from the 78th were aligned in the new Hybrid Warfare Composite Group and, as a result, Working Group number designators have been changed.

We also have two Focus Sessions planned for the 79th, one on National Security Risk Management (FS-1) and the other on Red-Blue Teaming (FS-2). As background, the MORS Board uses Focus Sessions as a forum on a particular “new or as-yet-unsatisfied” area of

interest for the membership. If there is a high enough level of interest at the symposium, this topical area may be included in an existing Working Group the following year or be considered as a potential new Working Group.

There will also be a Distributed Working Group (DWG-1) on Human Behavior and Performance. This effort began as a Focus Session in the 78th MORSS. A DWG provides a forum to address topics that aren't directly addressed by existing WGs and “has more material to cover than a single ninety-minute special session.” A DWG may address cross-cutting topics that potentially cross Working Group and/or Composite Group boundaries.

The Charter, Prospectus, and contact information for each Working Group is posted on the MORS website ([http://www.mors.org/events/79th\\_morss.aspx](http://www.mors.org/events/79th_morss.aspx)), providing details on each Group's focus for presentations. You can also find the Announcement and Call for Presentations (ACP) link and other symposium details on the MORS website.

We are looking forward to yet another exciting symposium and we look forward to your submissions and attendance! Please join us at the Naval Postgraduate School in Monterey, California, 20-23 June 2011.

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## Demonstrations and Poster Session at the 79th MORSS

*Daniel Dassow, The Boeing Company, [daniel.d.dassow@boeing.com](mailto:daniel.d.dassow@boeing.com)*

Got an intriguing model or application? Would your Symposium presentation benefit from a more intimate forum to show off the full potential of your concept and implementation? The 79th MORSS offers a full program of demonstrations and two poster sessions. These are a great opportunity to showcase your work and collaborate with peers.

As usual, we are also offering presenters the chance to demonstrate software, simulations, databases and other tools at the Naval Postgraduate School venue in Monterey. If you have a tool you have either developed or can showcase an interesting application in an otherwise available tool, we invite you to demonstrate it to the MORS community. While many demos have historically been simulations, we'd like to widen the search with your interesting applications of spreadsheets, modeling environments, and data collection and analysis technologies. We're hoping to have

some demonstrations available in a common area for attendees to drop by at their leisure and admire your handiwork. This is also a great opportunity to supplement your working group presentation with a demonstration of your analysis tools.

The 79th MORSS also provides a great opportunity to see great analysis. At the 79th MORSS in Monterey, we plan to continue the successful Poster Session during the MORS Membership Reception Monday evening and Welcome Mixer Tuesday evening. To add even more intellectual hors d'oeuvres to these events, we expect to offer presenters a “poster paper” to showcase their work either in addition to, or in place of, the usual working group presentations. We hope that the poster session will provide wider audiences for presenters sharing their projects. While MORS has always had the option for members to present poster papers, interest has fallen off in recent years. By displaying

posters at the Mixer, we will provide additional opportunities for learning, collaboration, and peer review.

Look for more details at the MORS website and in Symposium announcements. Share your successes with the analytic community. Sign up today to conduct a demonstration or participate in the poster session. Simply submit your abstract online through the 79th MORSS website. Be sure to select “Demonstration” and/or “Poster” on the abstract submission page. If you have ideas, questions or offerings, contact the Poster/Demo coordinator, Dan Dassow ([daniel.d.dassow@boeing.com](mailto:daniel.d.dassow@boeing.com)).

# The People are the Prize: Social Bonds as a Counterinsurgency Objective

Kevin Griffith, Center for Army Analysis, kevin.n.griffith@us.army.mil

*“We are moral beings to the extent that we are social beings.”*

– Emile Durkheim, *Moral Education*

*“Planners should start with broad measures of social and economic health or weakness when assessing environmental conditions.”*

– Army Field Manual 3-24, *Counterinsurgency*

*“In counterinsurgency, the people are the prize.”*

– Brig. Gen Larry Nicholson (USMC)

## Introduction

It has become almost cliché to state that the ‘people are the prize’ within a counterinsurgency (COIN) environment. Numerous scholars, authors, and military leaders have stated that COIN strategy must be increasingly population-focused. Despite this rhetoric, social factors that affect violence and delinquency have yet to be systematically accounted for in campaign objectives and assessments. Current assessments focus on the institutional factors and could be improved through the inclusion of additional social factors. The purpose of this article is two-fold. First, to address this measurement gap and make COIN assessments more holistic through the development of a new objective – social bonds – and provision of an assessment methodology that is grounded in crime theory. Second, to lay the groundwork for further analysis including an initial “proof-of-concept” study that empirically tests the impact of social bonds on insurgent activity and the development of best practices for improving social bonds in a COIN environment.

## A Look at Current Assessments

The current assessment mechanism evaluates progress towards three institutionally-oriented objectives – governance, security, and development. Assessments of governance are concerned with the ministerial capacity of the host-nation (HN) government. Questions focus on issues such as – can ministries put together a coherent strategic plan? Is this plan adequately tied to budget priorities? What is the level of corruption? Is the rule of law pre-eminent?

Assessments of security measure the capacity and capabilities of the HN security forces. Questions focus on such factors as the number of soldiers, police, and

their respective training levels. Measures of security such as the number of violent attacks are also recorded. The presence of a sufficient number of well-trained HN forces is expected to curb overt insurgent activity and violence. However, their effect on the underlying population behavior is not so clear.

Development is judged by the economic capacity of the host nation. This can include access to clean water, electricity, roads, jobs, and many other factors necessary for a functioning economy.

A variety of metrics have been used to measure progress towards these objectives ranging from tax collections, to levels of corruption, to gallons of water used. All of these measures have *prima facie* evidence that they are important. If residents have access to jobs, water, and protection then they will be less likely to support an insurgency. However, it is challenging to ascertain their direct causal effect on insurgent activity. Some criminology research has shown that a few of these measures, such as unemployment or poverty level, do not have significant impacts on violence or delinquency levels when other factors are controlled<sup>1</sup>.

Evaluating progress of a campaign using the current metrics is very difficult. One example of this problem can be found in a metric designed to measure the strategic planning capacity of government ministries. How can this capability to conduct strategic planning be quantified? What effect would a 10% improvement in a government ministry’s strategic planning capacity have on insurgent violence? The cause-and-effect relationship is hard to observe. Any scale that attempts to quantify this metric is at least somewhat arbitrary in nature and suffers from what evaluation professionals call an *instrumentation* threat to validity<sup>2</sup>. This threat arises due to differences in human judgment which can cause

wide differences in scoring. Instrumentation threats create data issues in evaluating the quality of HN security forces – capability ratings rise during an analyst’s deployment, then drop precipitously once a new analyst arrives and begin rising anew. Past experience has shown the difficulties in obtaining consistent and objective measurements in a COIN environment.

There is little doubt that institutional capacity – of the government, security forces, and the economy – is important to combat an insurgency. Past efforts to develop assessments of these areas have laid a solid foundation on which to build. If the goal is to measure progress in defeating an insurgency, then underlying social factors that drive it should also be addressed. The next section describes how Social Bond Theory provides a new campaign objective along with a robust assessment mechanism.

## Social Bond Theory

### General Background

Social Bond Theory is one of the most-cited theories used to explain crime and delinquency. Travis Hirschi’s *Causes of Delinquency* (1969) is the seminal work in this area, and his work has since been used extensively by scholars, making it one of the most influential theories of crime in existence. It is impossible to give a full treatment of the original theory and its future development here, but the basic tenets are highlighted.

Hirschi argued that social relationships play a highly significant role in determining an individual’s or group’s propensity for violence and delinquency (see Figure 1). Social bonds have a moderating effect on criminal behavior and weak social bonds lead to higher levels of delinquency or violence in a population. The entire range of delinquent acts, from gambling



**Figure 1: Relationships Between Social Bonds & Delinquency**

and drinking alcohol to violence and insurgency, are all viewed as having a common genesis – weak social bonds that are insufficient to control behavior. This approach downplays individual characteristics that have traditionally been the focus in studies of delinquency such as social class, employment status, or education level. Social Bond Theory does not deny that these factors are correlated with crime, but argues that these correlations are spurious and that differences in social bonds between individuals or groups can be used to explain variation in crime rates. Hirschi divides the relevant social bonds into four factors which are summarized below. Since ‘social bonds’ is an amorphous term that can have a variety of definitions for different individuals, please note that when the term is used in this paper it is referring to these four factors:

*Attachments.* This measures an individual’s attachments to others. Individuals who have strong attachments to others are less likely to commit delinquent acts. This is because they are generally more sensitive to the opinions, expectations, and wishes of others. An individual with weak attachments is more insensitive to the opinion of others and thus is not as constrained in his or her behavior. Children who respect their parents and engage in regular dialogue with their families are far less likely to commit crimes, which would cause familial hardship and disappointment. Alternatively, children who do not respect their parents’ opinions or wishes may commit crimes more freely because they are not concerned about the negative impacts their actions might have on their family<sup>3</sup>.

*Commitments.* This factor measures an individual’s investment in conventional behavior. This investment can be educational attainment, a career, a reputation, or other goods that an individual

does not wish to risk losing by becoming delinquent. Individuals with high levels of commitments are less likely to commit crimes because they have more to lose. Thus, an individual with a low level of education has a higher risk of delinquency not because he is ignorant, but because he does not have to worry about wasting the time and resources that have been spent to acquire a college degree.

*Beliefs.* This third grouping of social bonds captures an individual’s support for conventional norms. People vary in their respect for these norms and individuals who do not believe as strongly that they should follow the rules of organized society are less likely to respect those rules. This is not to infer that delinquents do not believe that their criminal actions are wrong; however, their beliefs in the moral validity of society’s rules are weakened to the point where they are not an effective control on behavior.

*Involvements.* The final factor measures the amount of time that a person spends in conventional activities such as working for an employer, studying for school, etc. People who spend more of their free time in certain conventional activities are less likely to commit delinquent acts. It appears that this factor may have some overlap with the commitments or attachments factors, since these activities could be viewed as investments in an individual’s future or the result of parental pressure. However, this factor retains statistical significance even after controlling for the other factors.

### Supporting Evidence & Limitations

Scholars have conducted numerous empirical tests of Social Bond Theory and have found that these four factors have statistically significant relationships with crime and delinquency<sup>4</sup>. The

academic literature contains several survey instruments that have been developed to measure social bonds, all of which are strikingly similar. Social bonds have been used to explain and predict a variety of delinquent behaviors such as drunken driving, childhood crimes, violence, truancy, theft, and poor parenting. Despite this, criminology experts continue to debate the different crime theories and compare their correctness and whether or not social bonds are the root cause of crime or a symptom of other factors. However, the fact remains that social bonds have been shown to be reliable predictors of violence and delinquency in a wide variety of scenarios and environments.

Social Bond Theory has three primary limitations in a COIN environment. First, while social bonds have been accurate predictors for many different types of delinquent acts, it has never before been used to explain or predict insurgent violence. Second, it does not completely explain all of the variation in violence and delinquency levels across groups<sup>5</sup>. This may be a result of survey instruments that by default lack perfect precision or due to the existence of other factors that influence an individual’s propensity for criminal behavior. Third, modeling the social bonds of a population requires reasonably accurate survey data.

These issues are not unique to Social Bond Theory. Data availability is a persistent problem, and there has been very limited research to date on the applicability of traditional crime theories to counterinsurgencies. Lastly, models by definition are simplified versions of reality. “Remember that all models are wrong; the practical question is how wrong do they [sic] have to be to not be useful<sup>6</sup>.” If Social Bond Theory can explain enough of the variation in crime and delinquency to correctly predict differences in insurgent violence and delinquency amongst population groups, then it would provide a powerful tool for analysis.

### Policy Implications

It has been reliably demonstrated that social bonds are effective predictors of violence and delinquency throughout a wide variety of populations. This ability

*See The People on following page...*

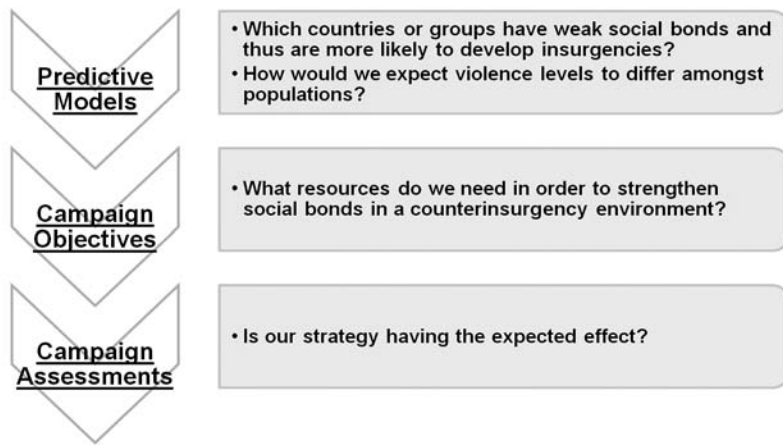


Figure 2: Possible Uses of a Social Bond Model

is not hindered by differences in culture, demography, or other factors. These facts lead to several uses for Social Bond Theory which are summarized in Figure 2 and the ensuing discussion. These uses are interlocking and mutually-supportive. Social bonds can initially be used to as a predictive tool to determine what groups are at-risk of insurgency. A country can be deemed at-risk if these groups make up large tranches of the population. If the situation arises, they may also be employed as an objective in a COIN campaign, and then as part of an assessment tool to evaluate the campaign's effectiveness and progress.

### Social Bonds as a Predictive Tool

The empirical evidence provides a straightforward model that can be used to predict variations in insurgent violence and activity. Measures of social bonds could be collected and aggregated to create a distribution for a particular population group or subgroup. These data would allow examination of the strengths and distributions of social bonds within the specified population. Analysts could identify situations where social bonds are weak in general or amongst large portions of the group. Since many insurgencies are characterized by weakness or absence of social bonds, this ability would allow analysts to predict which groups are most susceptible to an insurgency before it has even began. Military planners could use this information in designing war games and scenarios. Alternatively, preventative strategies could be employed to strength-

en social bonds amongst at-risk groups based upon best practices from the social science literature.

### Social Bonds as a Campaign Objective

As mentioned earlier, the current campaign objectives do not focus directly on population behavior. The objectives of governance, security, and development deal with the institutional capacities of the host nation's ministries, security force, and economy. The implicit assumption in this logic is that people will respect and follow strong institutions once they are formed. Social Bond Theory provides an opportunity to add a new objective, social bonds, which focuses on a root cause of insurgencies. Insurgencies are situations where social bonds have weakened to such a point that the social order unravels; strengthening of these bonds would naturally moderate violence and delinquency. Additionally, social bonds positively influence the other three objectives. Governance is more effective when citizens believe in social norms and the legitimacy of the government. Security is easier when people are attached to and care about others in their community or when individuals are too involved in conventional activities to become delinquent. Economic capacity is improved when people invest more resources in their education, careers, and other conventional activities.

Social Bond Theory would also provide a new perspective on campaign strategy. Social science experts can draw upon existing literature and develop best practices for strengthening these bonds in a COIN

environment and also what resources are required to accomplish that objective. These best practices can then be incorporated into campaign strategy to improve its effectiveness.

### Social Bonds in Campaign Assessments

If social bonds are included as a campaign objective, then existing criminology literature can be tapped to provide a related assessment methodology. Scholars have subjected Hirschi's four factors to several empirical tests which all use highly similar survey instruments. The questions used in these instruments are generalized and non-specific to any culture, geography, or society. The best practices from these studies can be combined to create a robust survey instrument that can be applied, quantified, and modeled in any counterinsurgency environment. Assessors can thus measure social bonds over time and monitor the progress and effectiveness of the COIN force in strengthening them.

It is important to note that, within this framework, the population of interest does not include the ideologically-committed insurgents themselves. Attempts to strengthen the social bonds of this group would likely be ineffective. The general population may be neutral, unsupportive, or indirectly supportive of the insurgency. If their social bonds are strengthened then they will be more open to aiding counterinsurgents and less willing to hide insurgents within their communities. Additionally, some insurgent groups could be co-opted or 'tipped' to support the counterinsurgent, such as the 'Sons of Iraq.' These latter groups should be the focus in assessments of social bonds.

There are two empirical issues that need to be addressed. The first is related to the 'attachments' factor for social bonds. It is possible that a particular family could support an insurgency and encourage its members to directly participate in violent acts. This could cause a measurement issue because while a high level of attachments would reduce criminal behavior for most people, a small group would exist where a similarly high level of attachments would increase these behaviors. However, this empirical issue can reasonably be assumed to be of negligible

importance. It is rather unlikely that these families could be surveyed. Insurgents would be unlikely to cooperate with a counterinsurgent-sponsored survey and even liberal estimates of their strength demonstrate that they make up a very small portion of the general population. This does not cause a selection threat to the survey's validity since insurgents are not included in the population of interest. Those that do choose to participate would instill only a small amount of error that should not be expected to significantly impact and bias the entire result, especially if the sample size is sufficiently large.

Secondly, cultural deviance theorists argue that a certain group's cultural beliefs may actually encourage or even require criminal acts. This could potentially confound the 'beliefs' factor for social bonds. Hypothetically, it would then be possible for a delinquent to maintain a high respect for social norms while committing crimes. To sidestep this potential empirical issue, this factor is focused narrowly on an individual's respect for the legal system, government institutions, and for those who follow traditional career paths. An insurgent would generally score very low in these areas. As discussed earlier, it is also not expected, nor is it desirable, that many insurgents would allow themselves to be included in a study sample.

## Conclusion

Crime theory represents an untapped field of research that the operations research community could draw upon to improve understanding of the social factors that influence violence and delinquency, including insurgent activity. Despite some limitations and difficulties, Social Bond Theory has been successfully applied in a variety of scenarios to predict a wide range of delinquent activity. It claims that all delinquent acts flow from weak social bonds and thus the theory can be used to explain all types of crime, including insurgent violence. Warfighters should strongly consider the policy implications outlined in the preceding section. This includes using social bond metrics as a predictive tool to measure the risk

of insurgent support amongst differing populations; incorporating social bonds as a key campaign objective; developing strategies to achieve this objective based upon best practices identified by subject-matter experts and the existing academic literature; and creating an assessment mechanism derived from empirical tests of Social Bond Theory.

Much work remains to be done. An important first step would be to complete a "proof-of-concept" study that involves a first wave of survey instruments in a counterinsurgency environment. The survey results would allow empirical tests of Social Bond Theory to be completed in a COIN environment, with the a priori expectation that areas with lower levels of social bonds will be plagued with higher levels of insurgent activity. Once confirmed, it is hopeful that the results would encourage further learning to be drawn from the social sciences and applied in the operations research field.

## Notes

1. For a more detailed discussion regarding which correlates of crime disappear under more rigorous experimental designs, see *Gottfredson & Hirschi* (1990). As an example, they show that the unemployed are more likely to be impulsive, self-centered, and unreliable. It is the character of the individual that causes both their joblessness and crime.
2. The Center for Social Research Methods has a first-rate online resources regarding this and other threats to study validity, accessible at <http://www.socialresearch-methods.net/kb/intsing.php>.
3. The effects of parenting on the development of juvenile delinquency is described at length in *Wilson & Petersilia* (2005), pp. 121-140.
4. Some examples of the many empirical tests of Social Bond Theory can be found in Durkin et. al (1999), Chapple et. al (2005), or Gardner & Shoemaker (1989).
5. *Lilly et. al* (2007) provide a thorough critique of Social Bond Theory, including its possible limitations.

6. This quote is generally attributed to George E.P. Box, professor emeritus at the University of Wisconsin and a pioneer in the fields of experimental design and quality control.

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### Israel Ira Deutsch, *Defense Analyst and Project Manager* – a Giant in our Profession



Israel Ira Deutsch, 91, died on July 15, 2010 at his home in Rockville, Maryland. Mr. Deutsch retired in the late 1970s after serving in various analysis and management positions in military operations research. His last position was with the Science and Technology Division at the Institute for Defense Analyses (IDA). He returned to IDA throughout his career and served military OR in various capacities. Ira first joined the Weapons Systems Evaluation Group (later becoming part of IDA) in 1952 after serving for three years at the U.S. Naval Ammunition Depot as a research chemist.

Mr. Deutsch was a native of New York and graduated from the City College of New York in 1939 in Chemistry as a Phi Beta Kappa. His graduate studies were in Kinetics of Organic Reactions at Ohio State University, Columbia University, and Brooklyn College Graduate School. After graduation from CCNY, he worked for the Crown Oil Products Corporation as a Research Chemist until joining the Army in 1943. He served in the South Pacific in World War II and after the war return to his position at Crown until leaving to join the Naval Ammunition Depot in 1948.

In 1959, he left IDA to work for the Coolidge Disarmament Commission for a year and in the 1960s he worked

as an analyst for Radio Corporation of America (RCA) and the MITRE Corporation. He was a Department Head at Bellcomm Inc. from 1963 to 1966 and served on leave of absence as Deputy Assistant Director, Arms Control Disarmament Agency from 1965 to 1966.

In 1966, Mr. Deutsch returned to IDA as Deputy Director of the Systems Evaluation Division and spent the next fifteen years in study management and as an IDA Research Staff Member working on a wide range of critical studies. He

**Although most of the studies he produced are still classified, and most of his colleagues are no longer professionally active, his prolific writing and significant contributions to the military analysis community will live on for many more years.**

continued to work as a consultant after retirement, making valuable contributions in the early 1980s. His work as an analyst, project leader, and study director is documented by over 40 limited release publications ranging from a Weapons Systems Evaluation Group (WSEG) report in July 1952 to IDA reports published as late as 1982. His professional impact shows a wide level of expertise and understanding of defense problems that broadened from his early years after joining WSEG when he worked primarily on weapons effects and technical evaluations related to chemical, biological, and radiological capabilities and defense to more global and strategic warfare analyses

in later years. In the late 1950s and 1960s he led studies and projects related to air defense and missile systems – to include a NATO air defense study, close air support for land forces, and a critical evaluation of current and near term communications requirements and emergency actions. During the 1970s and early 1980s he authored a number of studies related to war at sea and produced a nine-volume study on anti-submarine warfare and a net assessment of submarines. In his final years as a consultant, he participated in a major study determining net assessment methodologies and critical data elements for strategic and theater force comparisons and total force capability assessments. In later retirement years, he also enjoyed visiting antique shows and collecting stamps and medals.

Although most of the studies he produced are still classified, and most of his colleagues are no longer professionally active, his prolific writing and significant contributions to the military analysis community will live on for many more years.

Survivors include his wife of 56 years, Dorothy Kaplan Deutsch of Rockville; a daughter, Rachel Deutsch of McLean; and three grandchildren.



### The Mini-Symposium Zone

by R. Serling

*Column editor's note: a veteran of many, many MORS mini-symposia wrote this after a recent nightmare. He cannot say how much of it is based on what he experienced, how much is based on what he perpetrated, and how much is just dreamscape. But, he has recorded it for you, the community that organizes and attends these things...*



Lyle staggered in on Monday morning after a deeply unsatisfying weekend. His alma mater had been crushed in a major televised football game on Saturday. His favorite pro team had been similarly dispatched on Sunday. He had stayed up late watching people do home improvement projects that he should do, but never would. He had dressed badly, underwear inside out again.

Lyle skirted enemy cubicles to avoid more ridicule of his favorite teams. He made his way to the coffee mess, pouring himself a huge tankard of 110-octane caffeine. He downed half of it before noticing a very odd taste. The world began to spin, and Lyle crashed to the ground.

"OMG!" shouted the office manager, whose speech tended towards popular texting abbreviations in tense situations. "Lyle drank the pot that was on since Friday!"

Lyle didn't hear him. Instead, he heard a voice coming in over a cheap imitation starfield. It said:

There is a fifth dimension beyond that which is known to man. It is a dimension as vast as space and as timeless as infinity. It is the middle ground between light and shadow, between science and superstition, and it lies between the pit of man's fears and the summit of his knowledge. This is the dimension of imagination. It is an area which we call "The Mini-Symposium Zone".

Lyle awoke in a large room filled with people. They were mostly wearing coat and tie, but some sprawled in the back,

relaxing in their business casual. A huge screen contained a single slide that said "PLENARY SPEAKER." A well-turned out man fumbled through a set of index cards at a rostrum as a round of applause died down.

"Thank you for inviting me to speak at your, uh, meeting, uh, on the topic of..." He dropped an index card, contemplated it as it lay on the floor, and plowed ahead. "Well, on your meeting. Seeing all of you reminds me how much I hated math. But, I majored in psychology. I know better than to transfer that hatred to you."

The audience laughed in a forced, obligatory manner. "Since I became important, I've learned to appreciate what you do. Let me quote a famous wartime operational researcher, uh, P.M.S., uh Blackett..." Another index card dropped to the floor, leading to another pause. "Well... I'm sure he said something good. With initials like that, he must have known something about conflict!" The speaker laughed uproariously. "Enjoy your meeting – I've got a tee time at 1000!"

The world spun again and Lyle found himself in smaller classroom, filled with people shouting at each other. A slide projected on a whiteboard said, "MODELS AND TOOLS WORKING GROUP." A sweaty, balding man at the front was shouting for order.

"LADIES, GENTLEMEN, PLEASE!" he screamed. "LET THE SPEAKER FINISH!"

A red-faced man with his sleeves rolled up strode to the front of the room and advanced to a slide that said "CONSTRUCTIVE SIMULATION RESULTS." He began to explain some numbers that appeared in the third bullet. But another man with an even redder face jumped to his feet.

"AND HOW MANY YEARS AND HOW MANY MILLIONS DID IT TAKE?" he shouted. "DID THE DECISION MAKER LIVE LONG ENOUGH TO GET YOUR ANSWER OR DID

YOU PLANT IT ON TOP OF HIM?"

"YOU INSULT MY TOOL ONE MORE TIME AND I'LL SLICE YOU UP LIKE HOG BACON, SPREAD-SHEET BOY!" bellowed the man in front, whom Lyle supposed to be the speaker.

"OH YEAH? I GOT YOUR TOOL RIGHT HERE!" replied his tormentor, who then hurled his chair at the whiteboard.

With that, the whole room dissolved into a bench-clearing brawl. Lyle, who hadn't been there long enough to determine who was on what side, ducked too slowly to avoid a clutch purse to the head. As his universe rotated once more, he heard the moderator shouting, "NOT IN THE FACE! NOT IN THE FACE! NOT..."

Lyle recovered in a similar room, but there were no fisticuffs, shouting, or even red faces. Indeed, he wondered if he'd been teleported to some sort of Dweeb Club. A speaker was gesturing towards a chart labeled "PERSONNEL ACCESSION AND TRAINING TRENDS," while carefully avoiding eye contact with anyone in the room.

"As you can see, we have issues with a lack of military operations researchers with relevant Department of Motor Vehicles experience," he said haltingly. "In Fiscal Year 2009, we were only able to cross-train two DMV greeters and we got no driving examiners. We didn't even get any of the people who are responsible for randomly assigning waiting numbers to windows. Yes?" he said, noticing a woman who held her hand up patiently.

"I've never seen a greeter at any DMV in the 12 states I've lived in," she said. "Can you comment on that?"

"That should give you an indication of the enormous challenges we face," replied the speaker, staring at his shoes. "Now, let's move to Chart 117..."

See *Mini-Symposium* on following page...



*Mini-Symposium from previous page...*

Lyle's consciousness faded in what was becoming a familiar way and he awoke in yet another smallish room. This time, though, a group of plainly terrified people were huddled in a corner, trying to get away from a man advancing on them with what looked like a laser pointer. The now *de rigueur* projected slide said "DATA WORKING GROUP?"

"YOU WILL OBEY! I AM THE DATA WORKING GROUP LEAD! THERE IS ONLY ONE CONCLUSION AND YOU WILL SUPPORT IT!" He turned to Lyle. "YOU! STAND WITH ME OR FACE THE CONSEQUENCES! OUR OUTBRIEF WILL BE UNANIMOUS!"

Lyle froze. He didn't even know if he could talk in this weird world. "What – what do you stand for?" he stammered.

"WHAT DO I STAND FOR!" the crazed leader shouted. "FOR STANDARDIZATION! FOR CONCEPTUAL DATA MODELS! FOR FEDERAL ADVISORY BOARDS! FOR XML SCHEMA! ONLY WITH THOSE CAN WE ALL BE SAVED!"

"NEVER!" interrupted a man who had emerged from the scrum. "I WILL NOT SUBMIT TO YOUR TYRANNY! I WILL COLLECT AND VALIDATE DATA I NEED AS I SEE FIT!" He turned and marched towards the door.

The working group leader fixed his pointer on the back of the resistor. "NO DISSENT!" he roared as he pulled the trigger. With a loud noise that sounded like "ELDM" the weapon flashed, and the rebel was converted to confetti. "NOW YOU!" said the data despot, turning to Lyle.

But the floor tilted, and Lyle rotated away to a different room, containing only a handful of people. All of them seemed unusually composed and all radiated gravitas. "Hmmm," said one, contemplating some comments written on the whiteboard. "If I may," said another. He added a comment to the board. "Hmmm," said a third, raising an eyebrow at a fourth. Both of them turned to a fifth person,

who looked like he might be the last man in the United States that smoked a pipe in public. "Hmmm," said the senior. He wrote something in a small notebook. "Return to your sessions," he said. The others filed out of the room. Lyle noticed a small placard in the corner. It said, "SYNTHESIS WORKING GROUP?"

Lyle wanted to ask a question to the last person leaving, but the walls spun away again, leaving him in a featureless haze. The haze slowly cleared, and Lyle found himself back in the large room, but this time seated in the front row.

His seat was plush. He had water, juice, and coffee in front of him, in presentable glasses. He had been provided with a writing pad and a pen and a name plate was on the desk in front of him. It said "SPONSOR."

Lyle glanced around the room. It contained the same people he had seen before, but they were considerably more rumped. Remains of brownies and empty juice cans littered the tops of their desks. Many of them looked anesthetized.

The suspected pipe smoker was at the rostrum, speaking in an even, narcoleptic manner. "We have synthesized the results of the working groups," he began. "We, the synthesizers, bring to our conclusions the sum of our experiences and observations, some of which transcend the events of the last few days. Consequently, I may speak of things that were not discussed here, but instead were accreted over our long, collective service in the community."

The man next to Lyle groaned imperceptibly and reached for a dispenser on his desk. He then carefully taped his eyelids open.

The man at the rostrum finally finished, having related everything that had occurred in the last five decades in operational analysis to the events of the mini-symposium. He raised his arms over his head, and the lights dimmed.

"We conclude with our mantra," he said, and turned to the left side of the room. "Better models!" he exclaimed.

"BETTER MODELS," repeated the people on the left side of the room.

The synthesizer faced the center. "More people!" he exhorted.

"MORE PEOPLE," echoed those in the center.

The synthesizer turned to the right. "And standard data!" he said.

"STANDARD DATA," chanted those on the right.

"AGAIN!" said the synthesizer, voice rising.

"BETTER MODELS! MORE PEOPLE! STANDARD DATA!" repeated the crowd, their voices rising.

"AND AGAIN! EMBRACE THE OVERARCHING CONCLUSION! THE CENTRAL TRUTH OF ALL OUR SYMPOSIA!"

The crowd joined hands and struggled to their feet. "BETTER MODELS! MORE PEOPLE! STANDARD DATA! BETTER MODELS! MORE PEOPLE! STANDARD DATA! BETTER MODELS! MORE PEOPLE! STANDARD ..."

Lyle's world spun once more. He struggled to hang on to his consciousness, as he wanted to be ready for whatever bizarre room he found himself in next. The haze gathered then cleared, revealing the ceiling of the coffee mess.

"RUOK?" asked the office manager. "You really went to MEGO."

Lyle sat up, still reeling. "Better models?" he said, haltingly.

"WUF?" said the office manager.

"Look, maybe you should go home for the rest of the day. That coffee you drank is BN."

"Yeah, I'll do that," said Lyle, as he struggled to his feet.

"On the way out, take a look at this," said the office manager, offering Lyle a flyer. "We need someone to cover the sessions."

Lyle glanced at the paper. "UPCOMING MINI-SYMPOSIUM," it said. "EXAMINING ISSUES IN MODELS, MANNING, AND DATA." He dropped the flyer and ran towards the exit.

The office manager stared after him and shrugged. "Well, B2W," he said.



## “Full Spectrum Operations in a Complex Environment”

Doug Edwards, Center for Army Analysis, [miles.edwards@us.army.mil](mailto:miles.edwards@us.army.mil)

The 49th Army Operations Research Symposium (AORS), sponsored by the Center for Army Analysis, was hosted by and held at the Army Logistics University (ALU) on 13-14 October 2010 at Fort Lee, Virginia. The theme for the 49th AORS, “Full Spectrum Operations in a Complex Environment,” reflects the current role of the US Army in conducting operations that span the spectrum of conflict from humanitarian and civil support to counterinsurgency and general warfare in a dynamic and unpredictable global security environment.

The symposium provided a forum for sharing information and experience gained from ongoing and recently completed analyses, exposed junior and experienced practitioners to constructive critique, and broadened the perspective of the collective analytical community. Noteworthy moments from the 49th AORS included the presentation of the Army’s prestigious Dr. Wilbur B. Payne Memorial Awards for Excellence in Analysis, delivery of the keynote address by Mr. Don Tison, Assistant Deputy Chief of Staff for Programs, Office of the Deputy Chief of Staff, G-8, and induction of COL(Ret.) Leslie Griffin “Griff” Callahan, Jr. into the ORSA Hall of Fame during the 49th AORS Banquet.

Both civilian and military Operations Research and Systems Analysis (ORSA) analysts experienced a unique opportunity for mentoring and developing junior analysts. Many relationships were formed and renewed between agencies and individuals that will enhance the quality and conduct of analysis, fulfilling the goal of improving support to the US Army. A record number of individuals attended this symposium, which reflects the growing need for analytic studies and the increasing demand for the skills and capabilities provided by the ORSA analyst. Attendees represented many organizations including the four Army analysis agencies sponsoring AORS on a

rotating basis: the Center for Army Analysis (CAA), the Army Materiel Systems Analysis Activity (AMSAA), the Army Test and Evaluation Command (ATEC), and the TRADOC Analysis Center (TRAC). Numerous other individuals also participated from Department of the Army (DA) staff agencies, Department of Defense (DOD) contractors, and other DA organizations. International attendees from the United Kingdom, Australia, France, Germany, and Korea also took part in this year’s events.

AORS 2010 consisted of two presentation formats: general morning plenary sessions devoted to invited presentations and concurrent afternoon special sessions devoted to technical paper presentations. The first morning’s plenary session began in ALU’s Bunker Hall Green Auditorium with welcoming remarks provided by LTC James Miller, ALU, Mr. Rich Price, Dean of the College of Professional and Continuing Education, and Mr. E. B. Vandiver III, Director of CAA. Following the welcoming remarks, attendees heard a brief history of the Dr. Wilbur B. Payne Memorial Awards for Excellence in Analysis:

Established by the Secretary of the Army in 1980, to acknowledge excellence in Army Operations Research and Systems Analysis, these awards are presented each year to recognize the most significant contributions to Army decision-makers in two distinct categories: Small Group Analysis and Large Group Analysis.

Mr. E. B. Vandiver III presented this year’s Payne awards. The US Army TRAC – Fort Lee received the Small Group Analysis Award for their work on “Intra-Theater Airlift Planning-Redux,” which looked at using C-130 fixed-wing aircraft to augment CH-47 helicopters in Operation Iraqi Freedom (OIF). The US Army TRAC – White Sands Missile Range

(WSMR) received the Large Group Analysis Award for their work on “Non-Line of Sight-Launch System Analysis of Alternatives,” which examined the cost effectiveness of a new weapon system with respect to munitions already available.

Following the award presentation, the plenary session continued with a guest presentation from Mr. Scott Flood, the Acting Director of the United States Army Manpower Analysis Agency (USAMAA), who provided a brief overview of USAMAA. The presentation explained the type of analytical problems the manpower requirements community faces today and how the Army Operations Research community’s capabilities can be leveraged to help meet these challenges in the future.

The morning plenary session continued with presentations from analysts of the Dr. Wilbur B. Payne Memorial Award winning studies. MAJ Robert Spivey, TRAC – Fort Lee presented the Small Group award analysis. MAJ Patrick Workman, TRAC – White Sands Missile Range, followed with the presentation of the award winning study in the Large Group category.

Each year, the four sponsoring analytic agencies (CAA, AMSAA, TRAC and ATEC) select their most significant analytic studies conducted during the past year to be presented during this annual symposium. The authors of these papers are invited to present their analysis to the collected body of their peers gathered together during the plenary sessions of AORS. Mr. Vernon Marince, AMSAA, presented the first invited paper titled, “Tactical Collection Devices and Biometric Enterprise Capability Analyses of Alternatives.” The first day’s plenary session concluded with the presentation of the second invited paper given by Mr. Tom Spoon, CAA, titled “Army Force Generation Availability Exploration Study.”

Building on the previous year’s successful symposium, the 49th AORS institu-

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## *Symposium from previous page...*

tionalized the afternoon breakout sessions into a collection of enduring workgroup categories and expanded the special sessions program to include a set of topical categories that included Irregular Warfare and Counter-Insurgency Model Development and Unmanned Systems as special session topics for the 49th AORS. These new topical workgroup sessions may be tailored in future years to address relevant issues of the day and ensure that AORS provides a forum for the current “hot” topics within the Army analytic community. The enduring categories for the afternoon breakout sessions included sessions on Current Operations, Force Development, Future Capabilities, Sustainment, Manpower, Personnel & Training, Resource Analysis and Advances in Operations Research & Technology. Afternoon special sessions were organized as moderated forums based on abstract submissions and acceptance with two co-chairs presiding over each.

The evening of the first day concluded with a mixer at the Fort Lee Officers’ and Civilians’ Club where attendees could socialize and network with their peers and colleagues and featured musical entertainment provided by the Fort Lee Jazz Combo.

The second day’s plenary session began with the keynote address given by Mr. Donald C. Tison, Assistant Deputy Chief of Staff for Programs, Office of the Deputy Chief of Staff, G-8. Mr. Tison’s address, titled “The Efficiencies are Coming,” was well received and prompted informative discussion and a variety of questions from the audience. The keynote address was followed by presentation of a HQDA Study Plan Update given by Ms. Meghan Mariman, Office of the Deputy Chief of Staff, G-8, and recognition of



*Ms. Jerri Core, TRAC-Fort Leavenworth, presents a briefing as part of the Unmanned Systems group session.*

the 49th AORS Team for the work done in planning, coordinating, and executing the symposium. The session continued with the third of the four invited presentations, “Brigade Combat Team Unmanned Aircraft Systems Intelligence, Surveillance, and Reconnaissance Mix Analysis,” presented by Mr. Jerrie Core, TRAC, and was followed by the final invited paper presented by Dr. Carol Vesier, ATEC, titled “Projected Reliability of a DoD System.” COL(P) Cedric Wins, Office of the Deputy Chief of Staff, G-8 provided a Functional Area 49 Update as the concluding presentation of the session.

During the afternoon of the second day, both topical and enduring special sessions continued with the presentation of technical papers. A total of 109 OR-related technical papers were presented during the 49th AORS.

The 49th AORS culminated on the evening of the second day with an AORS Banquet and Operations Research Hall

of Fame Induction Ceremony. Mr. E. B. Vandiver III inducted COL(Ret.) Leslie Griffin “Griff” Callahan, Jr. into the Hall of Fame. Mr. Les Callahan, son of the late COL “Griff” Callahan, accepted the honor on behalf of his family. Plaques honoring and commemorating the achievements of COL “Griff” Callahan were on display throughout the banquet proceeding and will be placed in the ORSA Hall of Fame displays at Fort Lee, Aberdeen Proving Ground, MD, and in the Pentagon.

AMSAA will sponsor the 50th Army Operations Research Symposium in 2011 at Fort Lee, Virginia, which will, once again, be hosted by ALU. To participate in the Golden (50th) Anniversary of AORS, watch for the call for papers, registration information, and announcements in the summer of 2011.



## 2010 US Army Operations Research/Systems Analysis Hall of Fame Induction

Sheilah Simberg, US Army Materiel Systems Analysis Activity, sheilah.simberg@us.army.mil

The Center for Army Analysis sponsored the 49th Army Operations Research Symposium (AORS), which was hosted by the Army Logistics University in Ft. Lee, Virginia, 13-14 October 2010. Each year, the AORS concludes with the US Army Operations Research/Systems Analysis (ORSA) Hall of Fame Induction Banquet, which features the induction of historically distinguished Army operations research practitioners into the ORSA Hall of Fame. This year's inductee was COL (Ret.) Leslie Griffin ("Griff") Callahan, Jr. Ph.D., who was inducted into the ORSA Hall of Fame at the 49th AORS banquet on the evening of 14 October 2010.

Mr. Walter W. Hollis, the former Deputy Undersecretary of the Army for Operations Research, chartered the ORSA Hall of Fame in March 2004. The ORSA Hall of Fame honors those individuals who have contributed significantly to US Army Operations Research and Systems Analysis over a sustained period of time, have significantly impacted US Army Operations Research and Systems Analysis through doctrinal or technical accomplishment and innovative development, and have demonstrated outstanding personal leadership and noteworthy achievements that inspired others in the area of operations research. The charter of the ORSA Hall of Fame names the US Army Materiel Systems Analysis Activity at Aberdeen Proving Ground, Maryland, as its permanent location. The ORSA Hall of Fame is governed by a Board of Directors representing the leadership of the major analytic entities of the Army, who each year reviews the nominations and votes to induct up to two inductees per year. A 60-day nomination period begins each April wherein anyone can nominate an individual for consideration. Nominees can be any US Army Soldier or DA civilian, living or deceased. The ORSA Hall of Fame is proud to honor



*"Leslie G. Callahan, III and his wife Barbara Callahan accept the ORSA Hall of Fame Plaque from Mr. E.B. Vandiver III, FS, Director, CAA, on behalf of the late COL (Ret) Leslie Griffin Callahan Jr. Ph.D. The Hall of Fame resides at the USAMSAA, represented by Dr. W. Forrest Crain, Director."*

those members who have distinguished themselves with their significant contributions to the discipline and application of operations research and systems analysis during their period of military and/or civilian service.

### ORSA Hall of Fame Induction for 2010

#### Colonel Leslie Griffin "Griff" Callahan, Jr. Ph.D., US Army Retired

Colonel Callahan was nominated by Mr. E.B. Vandiver, Director of the Center for Army Analysis. Mr. Vandiver presided over the induction with a description of Colonel Callahan's military and civilian achievements and his contributions to the fields of military engineering and operations research. Colonel Callahan's son, Mr. Leslie Griffin Callahan III, attended the induction banquet on behalf of his late father and accepted the plaque that summarized the tremendous con-

tributions of Colonel Callahan's 28-year military and 16-year civilian career.

Colonel Callahan was born in Pocomoke City, Maryland 27 July 1923. He entered the United States Military Academy in 1941, graduating and receiving a commission as a Second Lieutenant, Coast Artillery Corps, 6 June 1944. He served on active duty until 1969 when he retired as a Colonel, Signal Corps. In addition to attendance at service schools, he earned a Master of Science degree in Electrical Engineering from the University of Pennsylvania in 1951 and a Ph.D. in 1961. He held a series of important positions in the field of research and development culminating as the Commanding Officer of the Harry Diamond Laboratories (1967-68).

He worked many years in Research and Development, the community that originally sponsored most of the Army's work in

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## *Hall of Fame from previous page...*

operations research. Within Research and Development, the Ordnance Corps was a leading proponent of Operations Research, holding four Operations Research Symposia between 1952 and 1961. Colonel Callahan was active in the last two of these events which were held at Rock Island Arsenal and Redstone Arsenal.

In 1962, as Executive Officer of the Army Research Office at Duke University, then Lieutenant Colonel Callahan's vision was instrumental in expanding the Operations Research Symposia from an Ordnance Corps event to the first Army-wide Operations Research Symposium. The AORS has been an annual event ever since, with the 50th AORS scheduled for the Fall of 2011. This is Colonel Griff Callahan's enduring legacy to the Army.

In 1969, upon retiring from the Army, Dr. Callahan became a member of the faculty of the School of Industrial and Systems Engineering at the Georgia Institute of Technology. In this capacity, he taught undergraduate and graduate courses in theory and practice of systems engineering and operations research. During his tenure at Georgia Tech he was very active in promoting, supervising, and mentoring the graduate civilian education of military officers. Georgia Tech was one of two schools (Tulane University was the other) to train Army officers for the new ORSA Specialty. The officers were engaged in studies leading to Masters and Doctorate degrees. Dr. Callahan obtained funding to support research with other faculty members and with the student of officers working on thesis research. This research was conducted for various military offices including the U.S. Army Ballistics Research Laboratory, the U.S. Army Operational Test and Evaluation Agency, the U.S. Army Materiel Systems Analysis Agency, the US Army Concepts Analysis Agency, and the Deputy Under Secretary of the Army for Operations Research.

Dr. Callahan was the author of numerous articles and technical reports including one of the first papers on the use of digital computers in military decision making, "Robot Generals", in 1953. He

retired from active teaching in 1985. However, he remained active at Georgia Tech. He established the Callahan Endowment for Military Research at Georgia Tech to promote and support the areas of military engineering and operations research. He also established the Callahan Lecture Series to promote national security and policy-making awareness at Georgia Tech. This lecture series included such prominent speakers as Senators Sam Nunn and Max Cleland, and Vice President Dick Cheney.

Even after his last retirement, Dr. Callahan occasionally performed specific analysis tasks for various Army activities and, whenever funding and health permitted, continued to attend the Army Operations Research Symposium. He passed away in Milledgeville, Georgia at the age of 83.

## **Previous Inductees into the ORSA Hall of Fame**

COL (Ret.) Leslie Griffin ("Griff") Callahan, Jr. Ph.D., joins twelve of the Army's great operations research pioneers in the ORSA Hall of Fame. The previous recipients are as follows:

Dr. Wilbur Payne, FS – Was the first Deputy Under Secretary of the Army for Operations Research, instrumental in establishing the position now known as technical advisor to the G-3 and in establishing the Center for Army Analysis.

Dr. Joseph Sperrazza – Pioneered analytical techniques for battle damage assessment, was instrumental in establishing the Army Materiel Systems Analysis Activity.

GEN (Ret.) Maxwell Thurman – Advocated the use of ORSA techniques throughout his 36-year military career and was instrumental in establishing the modern volunteer Army.

Mr. Hunter Woodall – Developed methods for testing and evaluating major combat formations, was a major contributor to the design of the 1st Cavalry Airmobile Division of the Vietnam era, and supervised the testing of the Apache attack helicopter.

Dr. Marion Bryson, FS – Contributed greatly to development of Army operational testing methods and espoused merging of military experience with scientific methods to improve battlefield realism in testing.

Mr. Keith Myers – Served as Director of AMSAA, developed statistical sampling methods for evaluating war reserve weapon stockpiles in Germany and Korea, and was instrumental in establishing technical and analytical exchange programs with the United Kingdom, Australia, and Canada.

Mr. Walter Hollis, FS – As Deputy Under Secretary of the Army for Operations Research, forged strong relationships among the acquisition, testing, and analysis communities, and was a tireless advocate for application of scientific methods to common problems of budgeting.

Mr. Abraham Golub – Developed statistical sampling techniques for evaluating the reliability of ammunition stockpiles, pioneered cost effectiveness studies and initiated the Army's quantitative process for estimating wartime force structure requirements.

Dr. Samuel Parry – Was the "guardian of Army Operations Research" at the Naval Postgraduate School, educating, mentoring, and inspiring hundreds of Army Officers to practice operations research as they began their analytic careers.

COL (Ret.) Seymour Goldberg – With 25 years of distinguished military service and another 19 years of superior Federal service, was a true Warrior-Analyst, strongly influencing every major study by the US Training and Doctrine Command (TRADOC) in its first decade.

Mr. Pete Reid – Developed new ORSA techniques for analyzing combat damage data, becoming a champion for real battlefield data to underpin analyses and wargames.

Mr. Daniel Dinkel O'Neill – Vanguard in the use of models and simulations when conducting analyses in test and evaluation in order to predict test results and to test data and findings.



## 2010 Dr. Wilbur B. Payne Memorial Award for Excellence in Analysis

Bill Ward, Center for Army Analysis, [george.wardiii@conus.army.mil](mailto:george.wardiii@conus.army.mil)

The Army's Deputy Chief of Staff, G-8, selected two studies to receive the prestigious Dr. Wilbur B. Payne Memorial Award for Excellence in Analysis during the 49th annual Army Operations Research Symposium (AORS) held at Fort Lee, Virginia in October 2010. In 1980, the Secretary of the Army established the Department of the Army Systems Analysis Award to acknowledge excellence in Army Operations Research and Systems Analysis. At the urging of the Deputy Under Secretary of the Army for Operations Research (DUSA(OR)), Walter W. Hollis, the Secretary of the Army, John O. Marsh, Jr., changed the name of the award in 1990 to honor the memory and contributions of Dr. Wilbur B. Payne, the first DUSA(OR). Dr. Payne was a pioneer in Army Operations Research and was considered the preeminent leader in the field for three decades.

The Payne Award is an annual award given in two different categories: Small Group and Large Group. On 13 October 2010, during the opening session of AORS, Mr. E. B. Vandiver III, Director, Center for Army Analysis, presented the Payne Awards. Each recipient received a plaque and a certificate signed by the Secretary of the Army, the Honorable John McHugh.

The US Army Training and Doctrine Command Analysis Center – Fort Lee (TRAC-Fort Lee) received the Payne Award in the Small Group category for recognition of its work on the "Intra-Theater Airlift Planning-Redux." This analysis examined using C-130 fixed-wing aircraft to augment CH-47 helicopters in Operation Iraqi Freedom (OIF). CH-47s are in very high demand because a significant number of troops require movement to and from bases within Iraq and air movement represents the fastest and safest form of travel. This extreme use was rapidly aging the aircraft fleet. The Deputy's Advisory Working Group (DAWG) tasked Transportation Command (TRANSCOM) in July 2009 to determine the



*Payne Small Group Award Presentation: Mr E.B. Vandiver III presents the award for Excellence in Analysis.*

effectiveness of using C-130 aircraft to reduce the blade hours of CH-47s in OIF. Subsequently, GEN Ray Odierno, Commander, US Forces-Iraq (USF-I), and BG Barbara Faulkenberry, Director of Air Mobility Forces, US Air Forces Central, each requested the same analysis in November 2009 and March 2010 respectively.

Aviation units use Air Movement Requests (AMRs) and Lift Tracker documents to specify the personnel/cargo requirements, point of origin, point of destination, and delivery date. The study team from TRAC-Fort Lee and TRANSCOM used various techniques to compile the data since different aviation organizations used different formats. To quantify the effectiveness of using C-130's for these missions, the study team employed a flight optimization model called Marine Assault Support Helicopter Planning Assistance Tool (MASHPAT). With the use of AMR information from a daily Lift Tracker, MASHPAT generated optimal routes and schedules for the designated day to satisfy the planned movements from that day's Lift Tracker. Based on similarities of the actual flight routes developed by aviation planners and the simulated flight routes created by MASHPAT, the team validated MASHPAT as an

appropriate model for generating CH-47 routes. By comparing simulated flight times of just CH-47s against a mix of CH-47s and one C-130, the team successfully demonstrated that the use of a C-130 could reduce CH-47 blade hours.

The study resulted in the Air Force allocating C-130 General Support-Appropriated (GS-A) missions to the USF-I Ground Component to transport troops and equipment that otherwise would have required CH-47 assets. Thus the study recommendations made significant impacts that reduced CH-47 blade hours and influenced the aviation force structure in theater.

### **Small Group Award Recipients:**

- LTC Dale Henderson, TRAC-Fort Lee
- MAJ Robert J. Spivey, TRAC-Fort Lee
- Mr. Donald R. Anderson, Joint Distribution Planning and Analysis Center, U.S. Transportation Command
- LTC Arlis D. Hummel, U.S. Army Headquarters, I-Corps
- MAJ John Wray, Marine Corps Combat Development Command

*See Payne Awards on following page...*



# ARMY OPERATIONS RESEARCH SYMPOSIUM

## *Payne Awards from previous page...*

Accepting the Small Group organizational award was:

Dr. Gordon Goodwin, Director, TRAC  
–Fort Lee

Also receiving agency plaques for the Small Group award were:

Mr. Bruce A. Busler, Director of Transportation Engineering Agency, on behalf of the Joint Distribution Planning and Analysis Center, U.S. Transportation Command.  
COL Raphael Brown, Marine Corps Combat Development Command.  
LTC Arlis D. Hummel, U.S. Army Headquarters, I-Corps.

TRAC – White Sands Missile Range received the Payne Award in the Large Group category for its work on “Non-Line of Sight-Launch System Analysis of Alternatives.” This analysis examined the cost effectiveness of a new weapon system with respect to munitions already available. The Office of the Secretary of Defense (OSD) and Defense Acquisition Executive (DAE) directed the Army to examine the cost-effectiveness of the Non-Line of Sight-Launch System Precision Attack Missile (NLOS-LS PAM) relative to other precision munitions available to support the Early Infantry Brigade Combat Team (EIBCT) in full spectrum operations. The results of the analysis were used to inform fielding decisions at a March 2010 interim Defense Acquisition Board review. TRAC-White Sands Missile Range led this analytic effort and assembled approximately 30 soldiers with experience in OIF and OEF in structured workshops to specifically define the operational setting in which precision fires would be employed.

The initial phase of analysis focused on defining the operational effectiveness of the NLOS-LS against the most likely and most dangerous set of EIBCT targets.



*Payne Large Group Award Presentation:  
Mr E.B. Vandiver III presents the award for Excellence in Analysis*

Once established, the PAM capabilities’ were compared against other precision munitions and systems available to the EIBCT to determine the relative effectiveness of each munition against identical targets. The analysis leveraged a mathematical goal program model to analyze the operational impact with respect to: residual risk to the force, individual munitions cost based on the Average Procurement Unit Cost, logistical impact to the force, and total mission demand (MD) satisfaction.

The study team developed a comprehensive understanding of EIBCT MD for precision munitions, near-precision munitions, and non-precision munitions across full spectrum operations. The team also determined the most cost-effective munitions mix to satisfy those demands using the goal program, while mitigating operational risk to the EIBCT.

The analysis focused on 20 munitions available to the EIBCT to satisfy 70 unique Irregular Warfare based MDs and 91 unique Major Combat Operation MDs within the EIBCTs’ areas of influence, as well as accounting for joint and echelons above brigade capabilities. The results presented to the Army and DoD

senior leadership were in the form of a price point analysis illustrating cost-effective options to inform decision makers.

Despite a compressed timeline of less than two months, TRAC-White Sands Missile Range produced robust analysis that determined that the NLOS-LS PAM was not cost effective when compared with other Army and joint precision munitions available to the EIBCT. The analysis enabled decisions by Army Staff Principals and the DAE that resulted in budget savings of approximately \$3.6B based on Army projected procurement quantities.

### **Large Group Award Recipients:**

TRAC - White Sands Missile Range  
LTC Everett Johnson  
MAJ Paul Keith Donnell  
MAJ Patrick Workman  
MAJ Benjamin Marlin  
Dr. Sylvania Acchione-Noel  
Mr. Rodney Eaton  
Ms. Rebecca Paz

Accepting the Large Group organizational award was:

Dr. Garry Lambert, Director, TRAC - White Sands Missile Range



## MORS Tisdale Graduate Research Award Strike Package-Target Pairing: Real-Time Optimization for Airborne Battlespace Command and Control

**Lieutenant Commander Connor S. McLemore, United States Navy  
B.S., United States Naval Academy, 2000  
Master of Science in Operations Research – September 2010  
Advisor: Matthew Carlyle, Department of Operations Research  
Second Reader: Gerald Brown, Department of Operations Research**

When an air strike is requested against a target, the desired end result is the rapid arrival of a strike package of appropriately armed aircraft that allows for the destruction of the target. However, the systems used by Airborne Battle Managers to pair strike packages to targets in real time are primitive. Tasking and reporting is done through radio communications recorded by hand and is time consuming and operator intensive. Tasking is shouted across the room or written on paper passed back and forth between battle managers and strike package-target pairing is done manually. Therefore, a system that improves the efficiency of the Airborne Battle Managers in a high-workload environment would also result in faster strike package-target pairing and tasking. We develop a model and associated Excel-based decision aid for optimal strike package-target pairing (or “pairing”) as agreed upon by Naval Strike and Air Warfare Center Subject Matter Experts [NBVC 2009] and creates pairings that best satisfy operational requirements. This decision aid will minimize data entry while replicating the decision processes that military operators use to perform strike package-target pairing. The starting point for this thesis will be the RAPT-OR model, developed in [Zacherl 2006]. The Zacherl thesis provides a weapon-target pairing planning tool; we adapt that model and accompanying user interface so that it can be used as a real time tactical decision aide for Airborne Battle Managers executing the Airborne Battlespace Command and Control (ABCC) mission.

Based on preliminary feedback from the strike planning community, this tool will improve the ability of military operators to effectively manage air to ground strike pairing in real time during major military campaigns, such as Desert Storm and the opening phases of Operation Iraqi Freedom.

### Biography of

**LCDR Connor S. McLemore, USN**  
Lieutenant Commander Connor S. “Sloppy” McLemore graduated from the U.S. Naval Academy in 2000 with a Bachelor of Science degree in Mechanical Engineering.

Lieutenant Commander McLemore was designated a Naval Flight Officer in 2002. Upon completion of flight training, he reported to his first fleet assignment with the “Sun Kings” of Carrier Airborne Early Warning Squadron 116 (VAW-116) aboard USS Constellation (CV 64). While at VAW-116, he deployed to the Persian Gulf in support of Operations Southern Watch and Iraqi Freedom, accumulating over 150 combat flight hours. In 2004, he deployed aboard USS Abraham Lincoln (CVN 72) to the Indian Ocean and Western Pacific in support of the humanitarian Operation Unified Assistance.

In 2005, Lieutenant Commander McLemore assumed duties as the Safety Department Head and a Weapons Tactics Instructor on the staff of Commander, Airborne Command Control and Logistics Wing (COMACCLOGWING) in Point Mugu, California.

In 2007, he returned to VAW-116 as Weapons and Tactics Instructor and was designated a CVW-2 Dynamic Strike



*Naval Postgraduate School President Retired Vice Admiral Daniel T. Oliver presenting the MORS Tisdale Graduate Research Award to LCDR Connor S. McLemore.*

Lead deployed aboard USS Abraham Lincoln (CVN 72). While at VAW-116, he deployed to the Arabian Gulf and Gulf of Oman in support of Operations Iraqi Freedom and Enduring Freedom, accumulating an additional 150 combat flight hours.

Lieutenant Commander McLemore is currently pursuing an Operations Research masters degree at the Naval Postgraduate School in Monterey, California.

Lieutenant Commander McLemore is a graduate of the Naval Fighter Weapons School (Topgun), Naval Aviation Safety Officer School, and Naval Strike and Air Warfare Center’s Advanced Mission Commander Course (AMCC). He completed the Joint Professional Military Education curriculum (Phase I) through the Naval War College in 2008.

Lieutenant Commander McLemore’s personal awards include the Air Medal (3 strike flights), two Navy and Marine Corps Commendation Medals, two Navy and Marine Corps Achievement Medals, and various unit and service awards.

Lieutenant Commander McLemore is married to Jessica Maria McLemore and they have one child, Sonia Maria McLemore.



## MORS Tisdale Graduate Research Award Combatting Irregular Warfare: Gaining Insight into Indigenous Populations via Social Survey Analyses

Lieutenant Kevin M. Moeller, United States Navy  
B.S., Jacksonville University, 2004

Master of Science in Operations Research – September 2010

Advisor: R.D. Fricker, II, Department of Operations Research

Second Reader: Samuel E. Buttrey, Department of Operations Research

Following the September 11, 2001 terrorist attacks, the United States took a hard stance against both terrorist organizations as well as those countries that offer refuge or serve as safe havens to those organizations. As terrorist organizations are driven from countries where refuge was once granted, they undoubtedly will seek safe havens in other countries in an effort to re-organize and continue their mission. In particular, many countries in Africa are plagued by political corruption, poor economic growth and outlook, and few natural resources, thereby making these countries potential safe havens for terrorist organizations. In order to continue to disrupt terrorist organizations' ability to remain organized and effective, it is imperative that the United States and its allies remain one step ahead of the terrorists by identifying potential safe havens and taking action to mitigate their usefulness to the terrorists. Annual surveys were conducted from 2007–2009 in specific countries in North Africa. These surveys were designed to address public attitudes towards domestic economic issues, social issues, and international affairs. The survey questions asked the indigenous population to provide a snapshot of their current lives, posing questions to provide insight about everyday life, social economics, employment opportunities, religion, political affiliations, views about the international community and specific terrorist organizations, as well as others.

This research develops and applies an analytical method to assess how support for terrorist organizations is related to these public attitudes. In so doing, the survey

results are combined into decision variables (factors), which in turn drive the response variable (Support Level for Terrorist Group "X") in a logistic regression model. This logistic regression model is in turn used to identify key factors associated to the population's support for a given terrorist organization from which limited resources might be applied in an effort to mitigate the risk of a given region becoming a terrorist safe haven.

### Biography Of LT Kevin M. Moeller, USN

Lieutenant Moeller was born on August 14, 1978, in Decatur, Illinois. LT Moeller graduated from Douglas MacArthur High School in Decatur, Illinois in 1996. Upon graduation from high school, he enlisted in the Navy and reported to Great Lakes Recruit Training Command. Upon graduation from Basic Training, he reported to Naval Nuclear Power School in Orlando, Florida and completed the Nuclear Training Pipeline in Charleston, South Carolina.

Upon completion of the Nuclear Training Pipeline, he was stationed on the USS Maine (SSBN-741B), home-ported in Kings Bay, Georgia. There he completed six strategic deterrent patrols, multiple dry-dock evolutions, and achieved the rank of Machinist Mate First Class. It was during this tour of duty that he was selected to participate in the Seaman to Admiral 21 (STA-21) officer accession program.

LT Moeller attended Jacksonville University and graduated with honors in May 2004 with a Bachelor of Science degree in Engineering Physics. He was selected for the Nuclear Submarine option and reported back to Charleston, South



*Naval Postgraduate School President Retired Vice Admiral Daniel T. Oliver presenting the MORS Tisdale Graduate Research Award to LT Kevin M. Moeller.*

Carolina following graduation and commissioning for Nuclear Power training. In May of 2005, LT Moeller completed the Nuclear Training Pipeline and reported to the Submarine Officers Basic Course in Groton, Connecticut.

Upon completion of the Submarine Officers Basic Course, LT Moeller reported to the USS Annapolis (SSN-760) home-ported in Groton, Connecticut. While there, he completed two six-month deployments in support of Operation Enduring Freedom and the Global War on Terrorism. While on the Annapolis, LT Moeller served as the Quality Assurance Officer, the Damage Control Officer, the Assistant Weapons Officer, the Reactor Controls Assistant, and the Assistant Engineering Officer. In 2007, he was selected as the SUBDEVRON 12 Junior Officer of the Year.

In September 2008, LT Moeller reported to the Naval Postgraduate School to complete a graduate degree in Operations Research.

After graduation, LT Moeller will be reporting to the Submarine Officer Advanced Course (SOAC) in Groton, Connecticut with a follow on operational Department Head tour.

LT Moeller is married to Lendsay Moeller, and they have two children, Braden (12) and Chandler (9).

# The Maritime Timeline Analysis and Requirements Toolset (M-TART)

N. Carson and J.D. Caron, Defence Research & Development Canada – Centre for Operational Research and Analysis (DRDC CORA),  
neil.carson@forces.gc.ca; jean-denis.caron2@forces.gc.ca

## Background

When the North American Aerospace Defense Command (NORAD) agreement was renewed in 2006, Maritime Warning (MW) was added to the mission set. Since then, there has been much debate as to what MW actually constitutes and where the Command and Control boundaries lie. This is further complicated for the United States, where the Commander of NORAD is also the Commander of United States Northern Command. The general consensus has been that NORAD MW brings together information and data provided by the activities of multiple agencies of both the United States and Canadian governments to provide a unique bi-national perspective and, if required, issue a warning to the governments of the United States and Canada.

Unlike the air domain, where the roles and relationships of the various agencies involved are well defined and understood, particularly since the events of September 11, 2001, the agencies involved in the maritime domain have far more complicated and varied relationships. A simple metaphor is to view the air domain relationships as a spider web of sorts, where the information, command and control pathways are many, but defined and traceable. The maritime domain can then be viewed as a pot of spaghetti noodles; very difficult to trace and constantly changing. This makes the decision space for MW complicated to comprehend and visualize. Out of this, several different questions are posed:

1. If you are going to produce a warning, when should you issue it?

2. Once you know when the warning needs to be issued, to whom should it be sent?
3. Lastly, do we have the systems and relationships in place to have enough information to be able to issue a warning to the correct people at the right time?

## Approach

In 2008, the Defence Research and Development Centre for Operational Research and Analysis (DRDC CORA) team located at NORAD headquarters was approached to help quantify the time and space problem of maritime warning by NORAD J32 (Maritime Warning - Operations). Due to the team's previous

*See Analysis on following page...*

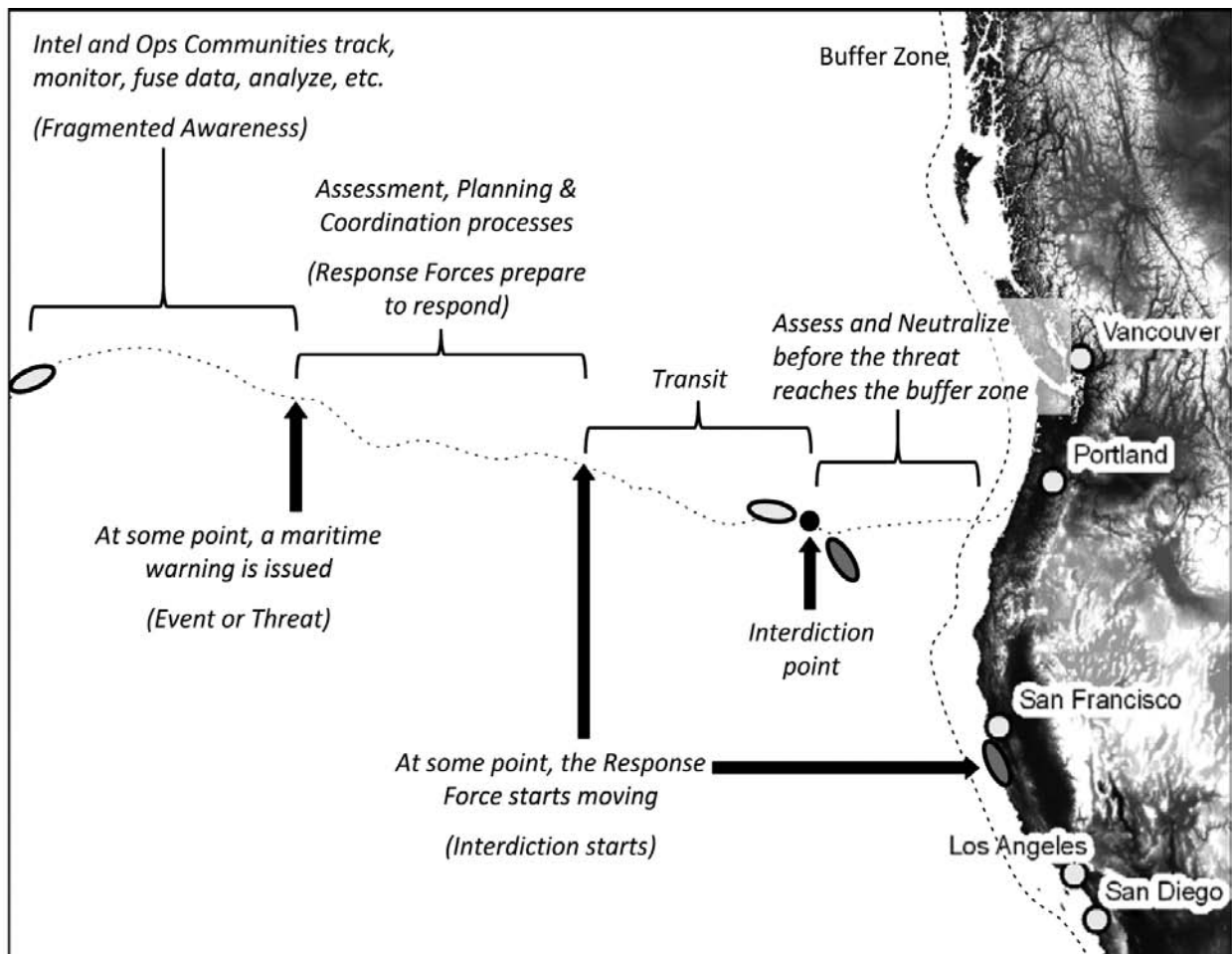


Figure 1. Graphical representation of the time and space problem of Maritime Warning.

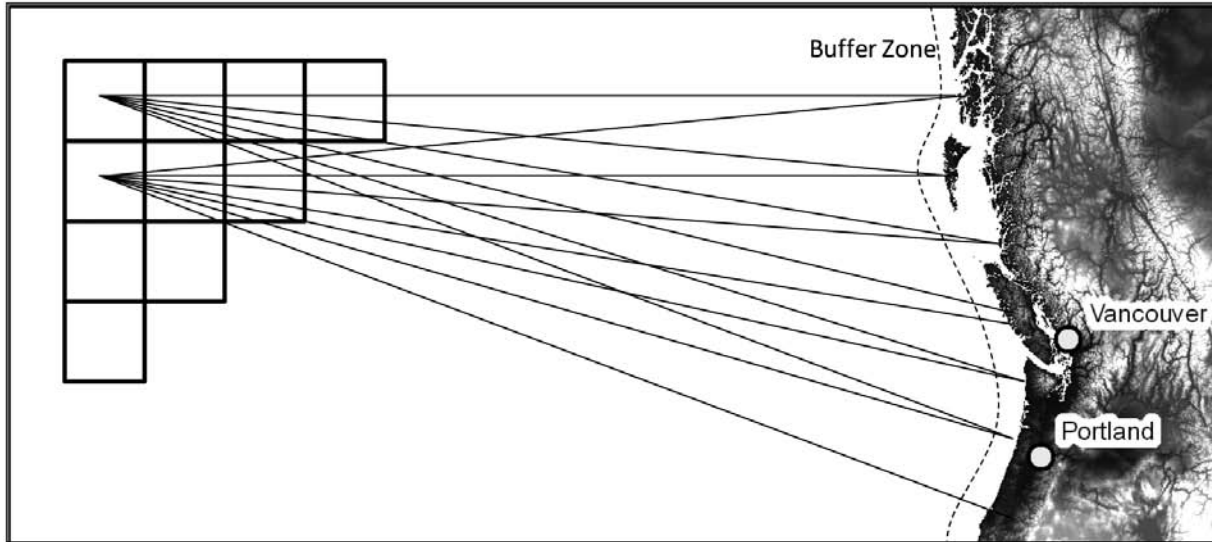


Figure 2. Graphical representation of the threat model used in M-TART.

experience examining similar problems in the aerospace warning and control domain, they were well suited to take on this problem.

The team's approach was to develop a deterministic model to represent the maritime timeline from warning to completion of response, entitled the Maritime Timeline Analysis and Requirements Toolset (M-TART). Figure 1 illustrates the basic problem. The simplest way to view it is to consider a single ship track across the ocean, a single response force capability, and a buffer zone that must be enforced by the response force.

Before any warning occurs, government agencies develop specific awareness of maritime activities based on their individual mandates. From a whole of government approach, this can be viewed as fragmented awareness, as many of the departments only share information subject to both the limitations defined by law and a need-to-know culture. At some point in this process, information about a specific vessel may become significant enough to warrant either issuing a warning or sharing with other departments and agencies to determine whether or not a warning needs to be issued.

Once a warning has been issued, the clock is started. First, there are a series of events that need to occur. These include the planning, assessment, and coordination of response processes. Of these processes, the amount of time it takes for a

response force to get underway can be the limiting factor, and this only starts once the decision is made to get the response force underway. Although Figure 1 shows a maritime response force capability, the response can be provided by either a maritime or airborne platform.

Once the response force has left its base, it takes a finite amount of time to reach the intercept point. The intercept point is calculated as the distance away from the buffer zone whereby the intercept force will be able to stop or alter the course of the threat vessel while still keeping it out of the buffer zone. Note that this assumes the destination of the threat vessel is known, so that the response force can position itself in the correct spot. Another way of viewing it, however, is that the response force will move in such a manner that they will always perform the intercept at the last minute, thus ensuring that they know where the threat vessel is. In either case, perfect or near-perfect surveillance and/or reconnaissance capabilities are implied.

If the threat can be intercepted at the appropriate distance away from the buffer zone, the mission is considered a success, i.e., the probability of success is 1 for that particular warning point and threat route. By calculating success at multiple points along the threat route, the minimum required warning distance can be determined for that particular threat / response force / buffer zone combination. This

represents the tactical utility of the model, whereby a single individual scenario can be analyzed.

In order to look at the problem from a strategic perspective, one can abstract the previous tactical example into a bigger picture view. First, consider multiple possible warning points across the ocean. For each warning point, there are multiple possible threat routes to the coast. Drawn as Great Circle routes, this picture now defines the unknown threat (which could be identified at any of the warning points) and the unknown destination (as shown by the multiple Great Circle threat routes for each warning point). A generic example of this is shown in Figure 2.

Then, for each warning point, an average probability of success can be calculated from the probability of success for each of that warning point's threat routes. If the points are sufficiently close together, the area around each warning point can be assumed to have a similar probability of success, allowing us to construct probability of success density plots for the ocean as shown in Figure 3a (where the lighter colors indicate a higher probability of success) and the corresponding probability of success curve based on distance from the coast is shown in Figure 3b.

We now look at the effect of modeling threat behavior. By default, the model considers all of the threat routes from each warning point to be equiprobable. While this assumption seems valid for

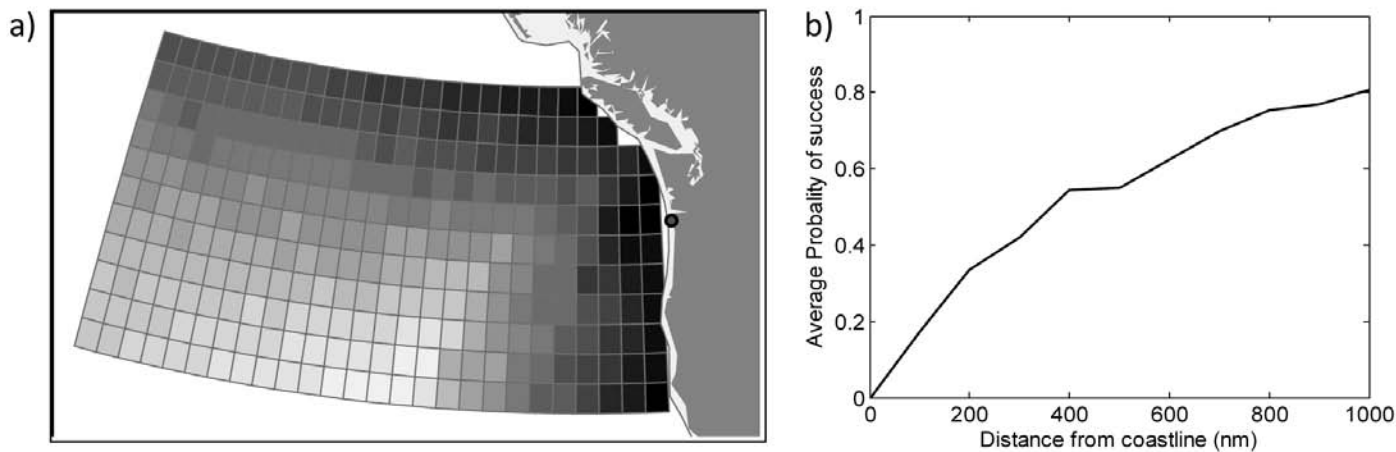


Figure 3. Example of a) probability of success density plot and b) corresponding probability of success curve.

warning points far from the coast, it also seems likely that as a threat approaches the coast, it will be more likely to head to the closest point on the coast (in the case of a threat simply trying to make it to the coast). This can be modeled by assigning each threat route a probability of occurrence, determined by its relative distance to the coast when compared to the other threat routes. By using the relative magnitudes of 1 over the distance to the coast, we are causing the threats with a shorter distance to the coast to be weighted higher. We can also apply a weighting exponent to the distances, thus making the shorter threat routes to be even more likely.

Since this weighting factor is used in the determination of the average probability of success, it only affects warning points where the probability of success is not 0 or 1, i.e. affecting the shape of the probability distribution curve between 0 and 1. The effect of the weighting factor is illustrated in Figure 4 which shows the average probability of success along set distances from the coast for weighting factors of 0, 1, and 2. The darker regions on the map indicate a lower probability of success, the lighter a higher probability of success. In each of the maps, the bottom left corner is 100% probability of success and remains unchanged. Similarly, the region directly in front of Cannon Beach (the square dot on the coast) is close to 0% probability of success and so also remains unchanged. As the weighting factor increases, we see the colors along

the coastline getting darker as the threat in the cells is more likely to head directly to the coast, thus lowering the average probability of success for that region. Determination of a value for the weighting factor can be determined by historical data if available or by subject matter expert opinion if not.

Up to this point, we have only considered one response force. Multiple response forces can also be modeled. In the simplest case, each response force location will only have a single capability. In this case each response force response capability is analyzed against each warning point threat route and if at least one can make it to the intercept point, then success is declared for that threat route. If multiple response forces can make the intercept, then a redundant success capability is recorded.

The above approach of using a single response force for each basing location is useful to develop a quick, generic understanding of high-level capabilities; however, it is likely that the response force capability at each basing location will vary with time. This occurs as response forces go in and out of maintenance cycles and alternate capabilities are substituted. If, from a strategic perspective, we are trying to understand capability over a longer period of time, over a year for example, then we need to capture this variability of availability.

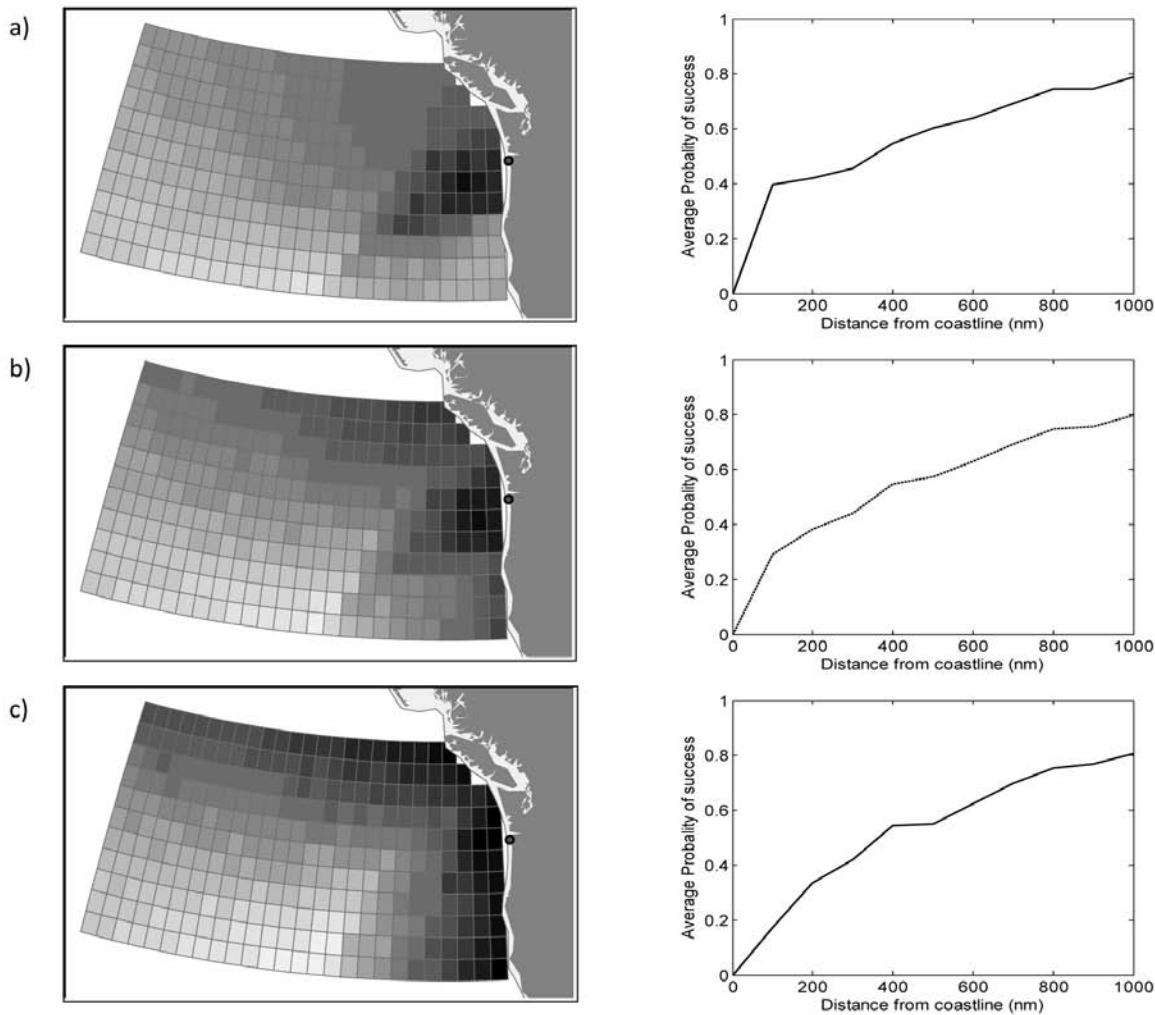
Consider, again, our simple example in Figure 1 with one threat and one response force basing location. We now add multiple response force capabilities

at this basing location, each with a fixed probability of availability where the total of these probabilities does not exceed 1. This assumes that overlapping capabilities at the same location will not occur and is based on the assumption that the most capable response force would be used. For a given warning point along the threat route, we calculate the success or failure for each of the response forces at the single base, resulting in an average probability of success for that base over the considered time period.

From our definitions, the only way the probability of success for that point can equal 1 is if all response force capabilities being considered are successful and the sum of the response force capabilities equals 1. This concept is then extended to calculating the average probability of success for a warning point by repeating the above calculation for the multiple threat routes.

Our next consideration is multiple response force locations, each with time-varying capabilities. Unlike the temporal activities on a given base, which are assumed to be coordinated and therefore considered to be dependent, we have chosen to assume that the response force capability at any given time for a base is independent of the response force capabilities at that same moment in time at the other bases. This assumption of independence is useful in simplifying the average probability of success for a particular point on a given threat route, as it allows us to define the probability

*See Analysis on following page...*



**Figure 4. Effect of threat behavior factor  $m$  on average probability of success. a)  $m=0$ , b)  $m=1$ , and c)  $m=2$**

of success against each threat route given multiple response force locations as 1 minus the probability of all the response force locations failing.

Thus far, this paper has shown the approach taken to determining probability of success based on warning locations, threat behavior, and response force posture. In describing the underlying mathematics in this paper, descriptions of some of the additional variables and algorithms used to make the model as accurate as possible have not been covered. What follows are some of the key features and parameters of the model that ensure realistic results are obtained.

To realistically model both threat and response force behavior, we have incorporated a custom-built land avoidance model that ensures sea surface vessels do not travel over land. In doing so, we have also accounted for the fact that different vessels will maintain different distances from land based on their characteristics. The model allows the user to specify different land proximity distances for the individual threats and the response forces. For airborne response forces, land avoidance can be disabled.

In addition to land avoidance parameters, each response force can be assigned individual capabilities. For example, tran-

sit speed and endurance will be unique to each type of response force. Similarly, the amount of time that is required to neutralize a threat is dependent on both the response force and the type of threat. Lastly, the basing location of the response force will often dictate both readiness time and how long before maximum transit speed can be reached, determined by base geography and activity levels.

### Utility

The outputs of M-TART can be used in multiple ways, from tactical to strategic. From a tactical perspective, it serves to inform decision makers of the risk they

assume by delaying warning or response activities based on real-world threat locations and current response force postures. The model allows for very quick analysis of single threat events. Deployed forces can also be entered into the model, allowing for decision makers to understand the difference between planned risk and real-time tactical risk.

From an operational perspective, the tool allows planners to understand the decision space around a particular operation and even look at the effects of various response force options. As an operational decision aid, it can be used to understand the implications of how much is known about any given vessel for any given position in the ocean with respect to the defined protected area(s). As an example, during a special event occurring in a coastal location, operational planners can use M-TART to understand the best combination of response force locations and readiness times while operating under the command and control limitations. The output of M-TART defines a decision to warn line, whereby any location between that decision to warn line and the coast might result in a failure to stop a threat.

From a strategic perspective, the outputs of M-TART are particularly applicable. First, the tool has the ability to calculate and show a high level perspective for coastal defense capabilities. The model can be used to look at typical traffic patterns, which then gives an indication of risk, based on a complicit threat; e.g., the container ship with a dangerous cargo of which the captain and crew are not aware. It can also be used to look at the adversary that does not follow traditional routes or approaches. In this case, modeling the threat as described above will represent the worst case scenario, whereby the threat is weighted towards trying to reach the coast as quickly as possible. As the threat routes are simply an input into M-TART, almost any conceivable type of threat can be modeled.

Using the average probability distance calculations, the model can aid in the formulation of requirements for warning,

i.e., we want to have a defined probability of success against complicit targets and another against non-complicit targets, which translates to specific distances from the coast. We can also identify surveillance requirements for critical areas, as it is difficult to warn and respond against a target if its location is not known.

This last point segues nicely into the final use from a strategic perspective, that of defining information sharing requirements. The outputs of the M-TART define where information sharing has to occur, for seldom in the maritime world is all of the information required to issue a warning collected and processed by a single organization. The outputs articulate in time and space requirements for information sharing between agencies, departments, and governments if the desired warning requirements are to be met.

Finally, from a force posture perspective, the model captures the load requirements placed on the individual response force bases. This can also be viewed as the utility of a base or how critical it is or could be to a particular type of response or threat.

In all of the preceding utility cases, M-TART is fully scalable from the large vessel, blue ocean response to the small boat, littoral response.

### **Limitations**

Although M-TART provides a comprehensive picture of maritime warning and response capabilities, there are some factors that have been identified to be incorporated into the next phase of development. Perhaps of most significance is modeling the effects of surveillance and reconnaissance activities. Currently, uncertainty in a threat's position can be accounted for by slowing down the speed of advance of the response force. Using this approach, we allow for the fact that the response force may move more quickly, but has to alter course more often and travel farther than the computed optimal course.

The desired approach is to incorporate surveillance coverage capabilities to determine in which regions we can identify

threats (and even assign a probability of detection, classification, and identification). We will then add reconnaissance capabilities to the model which will influence the response forces' capability to respond to the threat.

Another desired function in the model is the optimization of response force posture. A desired capability would be to be able to determine the most effective response force posture given some constraints such as basing locations and response force capabilities.

### **Conclusion**

In this paper we have documented and demonstrated a tool that can serve to improve our understanding of requirements for maritime warning, response, and domain awareness (in particular information sharing.) The toolset is scalable both from the tactical to the strategic and from the small to the large vessel threat. It can incorporate multiple response force capabilities, both air and maritime. Coming back to the initial three questions posed at the beginning of this article, the model can answer when and to whom a warning should be issued. These answers can be used to determine whether the required capabilities exist. In addition to providing a means to visualize the time and space continuum of Maritime Warning, the M-TART is also intended to complement other tools used to look at how we see, use, and consider response force posturing in the maritime domain.



### Right Force – ecroF thgiR

John Willis, Augustine Consulting, Inc., [jwillis@aciedge.com](mailto:jwillis@aciedge.com)

*There's no reason for having a Navy and Marine Corps. General Bradley tells me that amphibious operations are a thing of the past. We'll never have any more amphibious operations. That does away with the Marine Corps. And the Air Force can do anything the Navy can do nowadays, so that does away with the Navy.*

Secretary of Defense Louis A. Johnson, December 1949

This issue of PHALANX provides a preview of the upcoming MORS Special Meeting focused on the way ahead for DoD force structure analysis to be held 24-27 January 2011 at the TASC Heritage Conference Center in Chantilly, Virginia. The meeting will explore how we in the analytic community can best identify and assess force structure elements needed to achieve our national security objectives called for in current national security documents, specifically the QDR, DPPG, and OA-10. The meeting's objective is to review how the analysis community can help DoD answer the questions "Are we building the right force?" and "Are we building the force right?"

After the end of World War II, the generals of the newly formed US Air Force proposed that Congress fund the development of a large fleet of US-based long-range strategic heavy bombers beginning with the B-36 *Peacemaker* bomber. The admirals of the Navy ardently disagreed and instead proposed the funding of a large fleet of "supercarriers" with support-

ing battle groups beginning with the *USS United States* (CVA-58). In the struggle that followed the supercarrier/B-36 controversy, Defense Secretary Louis Johnson seemingly sided with the Air Force and in 1949, less than a month after taking office and without consulting Congress, ordered the cancellation of the *USS United States*.

The Organizational Research and Policy Division, Op-23, headed by Captain Arleigh A. Burke, began to gather material critical of the B-36's performance and capabilities. An "anonymous document" soon appeared, claiming that the B-36 was a "billion-dollar blunder" and alleging fraud on the part of B-36 contractors. The document stated that Johnson, who had been on the board of directors of Convair, manufacturer of the bomber, had a personal interest in its production.

Carl Vinson, chairman of the House Armed Services Committee, scheduled hearings to examine the matter. Those hearings, held in August 1949, proved conclusively that corruption was not involved in the B-36 contract and the issue thus appeared to be settled. The committee held that evaluation of the B-36's worth was the responsibility of the Weapons Systems Evaluation Group and that the services jointly should not pass judgment on weapons proposed by one service. But the Navy insisted upon further hearings to examine the broader issues of national defense strategy and the conduct of a future war. The Navy's very public disagreement with the President and SecDef, labeled "The Revolt of the Admirals", opened the discussion, still ongoing, in the American military establishment about the role of nuclear weapons, strategic bombing, and the unification of military command.

In this issue of PHALANX, we feature:

- Updates on plans for the 79<sup>th</sup> MORS Symposium to be held in Monterey, California;
- Technical articles on COIN assessments using a "social bonds" objective and a toolset for maritime analysis;
- A report on the recent AORS Symposium and its associated honors; and
- Upcoming meeting announcements and reports from other recently held MORS events.

As always, we welcome you to help us "Get it Right" with your articles, announcements, letters to the editor, and book reviews for publication in the PHALANX. Please keep your contributions coming for future PHALANX issues.

#### Sources:

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### Upcoming 2011 MORS Events

#### **MORS Leadership Forum**

7 December 2010  
0830-1630  
Walter E. Washington Convention Center  
801 Mount Vernon Place Northwest  
Salon H  
Washington D.C.  
More Information to Come!

#### **MORS Quarterly Member Reception**

7 December 2010  
Walter E. Washington Convention Center  
801 Mount Vernon Place Northwest  
Salon G  
Washington D.C.

#### **Force Structure Analysis Way Ahead**

(Classified)  
24-27 January 2011  
TASC Heritage Conference Center  
4803 Stonecroft Boulevard  
Chantilly, VA

#### **Educational and Professional Development**

##### **Colloquium**

8-10 March 2011  
Virginia Military Institute  
Lexington, VA

##### **Mission Assurance: Analysis for Cyber Operations**

(Classified - US Only)  
21-24 March 2011  
Southwest Research Institute (SwRI)  
6220 Culebra Road  
San Antonio, TX  
More information to come!

##### **Maritime Domain Awareness II**

(Classified)  
2-5 May 2011  
Anti-Submarine Warfare (ASW) Base  
San Diego, CA  
More information to come!

##### **79th MORS Symposium**

(Classified - US Only)  
“Developing the Next Generation of National Security Analysts”  
20-23 June 2011  
Naval Postgraduate School  
Monterey, CA

Stay tuned for more details in the coming months! Check our website at [www.mors.org](http://www.mors.org) for the latest updates...the Terms of Reference (TOR), meeting agendas, hotel information and rates, as well as other valuable meeting and logistics information.