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MORS Special Meeting: Analyzing the Value of Infrastructure

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Background

MORS last sponsored a mini-symposium related to infrastructure in 1998. The meeting titled *DoD Infrastructure: Why it is and What does it Cost?* discussed issues, data and processes that were needed to identify infrastructure requirements and costs in specified areas for the DoD. The common findings from this effort included “the assumptions of the utility of infrastructure, the need to refine performance measures, the constraints to implement changes to infrastructure and the existing and recommended initiatives to create efficiencies.”¹ Many of these same issues are relevant today.

The world related to DoD infrastructure has changed significantly since 1998. Base Realignment and Closure (BRAC) proceedings have continued and focus more on supporting force repositioning and less on closure of excess infrastructure. Other issues impacting the DoD infrastructure include increased privatization efforts, global force stationing, global war on terror (GWOT), and force and business transformation initiatives. The current defense posture worldwide requires the DoD to continually upgrade and modernize infrastructure. Constrained resources however drive the need for alternative strategies to address future infrastructure issues. These issues led to the most recent MORS meeting on infrastructure.

Overview:

Analyzing the Value of Infrastructure 14-16 November 2006 at Carlisle Barracks, PA

Importance of Meeting: Enable analysts to develop/refine criteria regarding worldwide basing and infrastructure requirements considering the implications of new strategies for basing and infrastructure support being considered by the Department of Defense.

General Co-Chairs: Dr Craig College, Army Deputy Assistant Chief of Staff for Installation Management; Ms Anne Davis, Deputy Commander of Navy Installations Command; Mr Michael Aimone, Air Force Assistant Deputy Chief of Staff for Logistics, Installations and Mission Support.

Meeting Format: 1 Day Mini-Symposium and 1.5 Day Workshop

Day 1 Speakers: Keynote by Mr Philip Grone, Deputy Undersecretary of Defense, Installations and Environment on the OSD Perspective on Infrastructure. Talks by each General Co-Chair and a talk on *A View from Outside on Military Infrastructure* by Barry Holman from the GAO.

Working Groups

- Future Infrastructure Requirements
- Performance Metrics
- World-Wide Basing Locations
- Synthesis Group (Chair Dr Lee Lehmkuhl)

Figure 1. Overview of the AVI Special Meeting

Meeting Overview

The MORS Special Meeting on *Analyzing the Value of Infrastructure* (AVI) was held at the United States Army's Center for Strategic Leadership located at Carlisle Barracks, Pennsylvania from 14-16 November 2006. The meeting sought to lay a foundation for measuring the military value of infrastructure and projecting future infra-

structure requirements from a Joint perspective. The meeting's analytic focus areas were: future infrastructure requirements; performance metrics measuring infrastructure efficiencies; and world-wide basing assessment. The AVI meeting enabled analysts to develop and refine criteria regarding worldwide basing and infrastructure requirements. (See SPECIAL MEETING, p. 31)

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ments considering the implications of new strategies for basing and infrastructure support being considered by the DoD.

The special meeting was organized as a Joint effort and involved the DoD, Army, Navy and Air Force leaders and analysts. Figure 1 provides an overview of the meeting.

Key leaders provided their views on the issues and challenges in the DoD infrastructure arena on the first day of the meeting. Each working group met during the remaining day and a half to work on one of the following strategic analytical focus areas: Future Infrastructure Requirements, Performance Metrics, and World-Wide Basing locations. **Pat McKenna** provided the MORS President's Welcome, and **Dr Jacqueline Henningsen**, FS, delivered the MORS Sponsor's Welcome. Professor **Doug Campbell**, Director of the Center for Strategic Leadership, was gracious in his Host Welcome, and his facility exceeded the attendees' highest expectations.

Mini-Symposium

Mr **Philip W. Grone**, Deputy Undersecretary of Defense, Installations and Environment, set the tone for the meeting when he provided the Office of the Secretary of Defense (OSD) Perspective on Infrastructure. Mr Grone challenged the attendees with two questions:

- 1) How do we think about value?
- 2) How do we think about infrastructure?

Mr Grone highlighted that the DoD does not have the luxury to just shut down plants (infrastructure). Prior rounds of BRAC closed a great deal of excess capacity. However the latest round yielded extensive relocation of units and organizations to installations that could better support their mission accomplishment in the long term. This means the DoD needs to find ways for adaptive reuse of current infrastructure to potentially meet new needs. This includes changing construction methods that allow for flexible facilities that can be used for multiple applications. The infrastructure challenge is exacerbated by transformation initiatives that involve the repositioning of \$45 billion worth of assets (\$27 billion abroad and \$18 billion in CONUS).

Mr Grone emphasized that infrastructure operators and analysts need to collectively help the DoD get a common operating pic-

ture of infrastructure that can answer five fundamental questions:

- 1) What do I own?
- 2) Where is it?
- 3) How much funding is required to operate it?
- 4) What is its condition?
- 5) What is its capability?

Any tools and methods to get this picture need to be Joint and need to articulate capabilities and explicitly consider force protection issues. These answers should be integrated with the acquisition, planning, and requirements generation processes in order to support strategic decisions that impact mission readiness.

Dr Craig College, Deputy Assistant Chief of Staff for Installation Management (ACSIM) presented the Army Perspective on Infrastructure. He highlighted the complexity of Army infrastructure since it equates to a land mass approximately the size of West Virginia and includes towns and hundreds of thousands of facilities. Installations need to be 'flagships' for Army forces that provide common levels of service across the Army and DoD. Dr College stated clearly that infrastructure needs to be an explicit consideration of transformation decisions because the Army cannot support global realignment without solving infrastructure issues.

Dr College held that the Army and the DoD do better infrastructure planning for today than for the mid- and long-term, because of uncertainty and risk. To improve, organizations need to professionally develop leaders in managing change. More focus needs to be put on the mid- and long-term to determine the resources needed in the future and why. The crux of this issue is how to make this planning credible in order to compete against acquisition programs for scarce resources. To do this requires emphasis on three pillars:

- 1) What do we need (future infrastructure requirements)?
- 2) How (transformational strategies)?
- 3) Measures of success (performance metrics)?

In terms of automated infrastructure planning systems, the Army's Real Property Planning and Analysis System (RPLANS) adequately captures capabilities and costs for today. However current systems do not capture what future capability requirements should be. Dr College challenged the ana-

lytical community to work on questions in this area:

- What should such an analytical tool be?
- Should it just be a way of thinking?
- What data is needed (inputs)?
- What should be the outputs?
- Who should do this?

Dr College challenged the analytical community to develop the 'production function' for military infrastructure. Infrastructure needs to provide value to the warfighter and must be articulated in these terms. When infrastructure is discussed in terms of its impact on mission accomplishment at the same level as the impact of equipment and people on mission accomplishment it will receive the resource and leadership focus it deserves.

Ms Anne Davis, Deputy Commander of Navy Installations Command (CNIC), next presented the Navy Perspective on Infrastructure. She described the recent history of installation management in the Navy and what drove it to adopt a regional management structure, which reduced the number of management organizations from 18 to 8. One continuing battle from this transformation is reducing the number of legacy information systems that make management processes inherently inefficient.

Ms Davis challenged the analytical community to help answer the question "how do we know if we are putting our infrastructure dollars where they are needed?" The CNIC is an enabler that provides support in critical mission areas for all warfare enterprises of the Navy (e.g. the naval aviation enterprise). Ideally the mapping of CNIC organizational functions to warfighter domains (output) and other Navy supporters and enablers should lead to determining where to spend the marginal dollar on infrastructure and to an expected outcome of this expenditure. The Navy's Defense Readiness Reporting System-Navy (DRRS-N) is a giant step in the right direction for dealing with this challenge for the CNIC. The DRRS-N will report a facilities condition but also link its outputs to readiness ratings and the impact of infrastructure on the combat capabilities of the warfare enterprises. With this information leaders can then make more informed decisions about where to spend the marginal dollar for infrastructure.

Ms Davis wants to get to the point where installations are considered an extension of the fleet, that is, that installations are con-
(See **SPECIAL MEETING**, p. 32)

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sidered as an extension of the warfighter component. This will require continual mission insight in this process but will also provide new and better ways to synthesize information for senior leaders who make the trade-off decisions for resource allocation.

The Headquarters United States Air Force Office of the Deputy Chief of Staff for Logistics, Installations and Mission Support was involved with the planning and execution of this special meeting. Major **Mark Donnithorne** presented the Air Force Perspective on Infrastructure for Brigadier General **Tom Lynn**, the Associate Deputy Chief of Staff. Air Force infrastructure is equivalent to 15 times the size of Rhode Island including facility space of 108 times that of the Pentagon. The major challenge facing Air Force infrastructure now is developing and maintaining expeditionary basing to support global operations in support of the GWOT. As an example, the Air Force Civil Engineering functions opened about 50 air bases in support of Operation Enduring Freedom.

Installation management in the Air Force is performed by the Major Commands due to their mission. Major Donnithorne described the primary infrastructure and installation management challenges of the Air Force as:

- Skyrocketing costs of utilities
- Enabling Air Force transformation
- Providing quality housing for airmen/families
- Implementing BRAC
- Proactively supporting the environment
- Properly sustaining our infrastructure
- Properly recapitalizing our aging infrastructure
- A declining workforce

The mini-symposium portion of the meeting ended with an insightful presentation on an Outside View of Military Infrastructure by Mr **Barry W. Holman**, the Director of the Defense Capabilities and Management Team for the US Government Accounting Office (GAO). Mr Holman has extensive experience on a variety of GAO engagements that have provided insights to the DoD regarding infrastructure management issues. Mr Holman stated that Infrastructure Management has been part of the GAO's high-risk list of government programs since 1997 (and this list has about 25 programs on it).

Mr Holman provided insights regarding several infrastructure areas for the DoD. The A76 effort presents challenges to installations because they are looking to outsource an already reduced level of service. This will be particularly tough on installations growing due to BRAC. His prediction is that funding trends for base operations and facilities are not sufficient to meet needs. The GAO has seen improvement in the DoD's efforts in developing strategic plans for installations. A remaining challenge is how to provide a common level of services for a diverse set of customers. He also stated that there is a need to balance centralized installation management with the flexibility needed to provide common levels of service to the diverse customer base at the installation level. Another area in which the DoD can improve is quantifying what training ranges it has and what is needed. Mr Holman's observations on BRAC were that the proceedings from 1988-1995 reduced 20% of bases and facilities while the 2005 BRAC proceedings led to little true reduction of bases and facilities space. Most of the 2005 proceedings led to reengineering; however, the DoD still has a challenge with demolishing excess facilities. The GAO's early observation regarding housing privatization is that installations are experiencing a lower occupancy rate than expected. The DoD may need to consider if basic allowance for housing rates are a factor leading to these lower than expected occupancy rates. Another observation is that there is an inconsistent approach to measuring customer satisfaction in the housing privatization program. Finally, Mr Holman provided some thoughts on the DoD overseas rebasing initiatives. His concern is that while new facilities are being built the DoD will not have the funding to support the sustainment, renovation and maintenance of these facilities.

Mr Holman provided some excellent questions that leaders and analysts should think about when developing metrics for infrastructure:

- What metrics are needed to defend facility sustainment, restoration, and modernization requirements, capture trends in backlogs in a credible, consistent manner, and measure the impact of shortfalls?
- What metrics are needed to depict trends in sustainment funding requested, allocated, and obligated (national and installation level)?
- What metrics are needed to defend personnel required to support base operations

at the installation level?

- What metrics might be useful in depicting the adverse impact of delayed appropriations, allocations, and reallocations?
- What specific actions, incremental steps, timeframes, and measurable outcomes (metrics) are needed to accomplish broad goals/objectives outlined in strategic plans?
- What metrics would be useful in capturing the adequacy of service delivery at installations serving multiple diverse missions?
- What metrics could be useful in identifying/updating excess facilities and cost/benefits of eliminating them?

There were common themes sounded in each of the mini-symposium presentations. Problems with data accuracy, availability, and even existence were cited. Speakers also pointed to a plethora of metrics, but stated that current metrics do not generally address the value of infrastructure to the warfighter. Strategic planning for infrastructure was another commonly cited problem area. The DoD can also improve infrastructure governance that encompasses process management and process enforcement. Finally, there was mutual recognition of differences between the military services in their approach to infrastructure that must be addressed if joint infrastructure trades are to occur.

Future Infrastructure Requirements Working Group

The DoD installations are deployment and sustainment platforms with robust capabilities where warfighters live, train, mobilize, and deploy to fight and win. Many possible future operating environments drive future infrastructure requirements while the pressures of constrained resources drive the need to consider infrastructure from a more joint perspective. This working group focused its work on two primary objectives.

The first objective of this working group was to achieve a common understanding of the principal drivers of infrastructure requirements across the various types of installations of each of the military departments. What drives the demand is the size and composition of the force along with what they need to train, mobilize, and deploy. The drivers are categorized as global, which principally are factors largely outside the control of the Services; and local, which are largely inside the control of the

Services. The global drivers are extensive: planned and plausible national security threats, the National Security, Defense and Military Strategies, the Quadrennial Defense Review, ongoing operations, history, treaties and alliances, public laws and statutes, environmental concerns, the economy and defense budget. The primary internal drivers are force structure and doctrine, organization, training, material, leader development and personnel (DOTMLP) issues. However, force structure and DOTMLP are driven by many of the external drivers previously mentioned. Privatization, e.g., enhanced used leases, the Residential Community Initiative (RCI), and Common Quality of Life standards are also drivers that help with retention of an all volunteer force. Organization culture drives requirements through infrastructure maintenance, which may result in suboptimal solutions due to decentralized control, i.e., the way things have been done in the past tend to be the way we want to do things in the future.

The other objective on which this working group focused was *to identify key obstacles and risks to considering installations jointly and to suggest steps to overcome these obstacles*. When considering installations jointly, one must remember that Jointness is a means to an end. Joint provides benefit if it results in increased efficiency or improved operations. The working group identified the primary obstacles to considering Joint infrastructure as:

- Decentralized infrastructure management by the Services
- Lack of common definitions
- Lack of common standards
- Divergent missions or functions
- Unlike size and scale
- Determining who pays
- Change required
- Lack of common long-term planning horizon
- Lack of geographic proximity

Regarding risk, the DoD and the Services will have to adapt their strategies and policies to unforeseeable changes in international and domestic conditions over the next 20 years. Strategy can change more quickly than infrastructure can. Some infrastructure decisions, particularly those associated with BRAC, are indeed irreversible. Hence, it is of the utmost importance for the DoD and the Services to deal now with futures that are plausible but inconsistent

with the assumptions underlying current strategy. Such an analysis will lead to hedging actions that will permit the DoD to deal with such changes should they occur, by ensuring that installations retain enough of the needed capacities to respond to changes in conditions. For example, the DoD and the Services should consider what changes could affect either the demand for infrastructure or its supply, such as an increase in force structure, or the loss of significant training areas due to encroachment, hurricanes or other natural disasters, or contamination by weapons of mass destruction (WMD). In the context of joint basing, operational risk could increase if multiple functions are consolidated on a smaller total number of installations. These large, multi-functional installations could become more attractive targets for terrorist attacks, or cause more significant challenges if they are made temporarily unusable by natural disasters.

Consider this simple example motivated by one of the mini-symposium speakers concerning risk. When building a house, there is a tradeoff of time, quality, and dollars. If you pay top dollar, you can expect top quality in a timely manner. If you reduce the expenditure, either time will increase, quality will decrease, or both. There is a production function that can capture this relationship. There should also be a production function for military infrastructure. If you reduce dollars, time (readiness) is impacted, or quality, or both. The DoD needs metrics to measure this production function. Ultimately, the output of this function is measured in some form of risk. In the long-term the value of infrastructure must be tied to warfighter values.

Performance Metrics Working Group

Experience with the BRAC process showed the need for infrastructure metrics and use of the BRAC-type process on a regular basis. The aim of the metrics is to become efficient in infrastructure management, and to provide support to the warfighter. With this in mind, the focus of the working group was two-fold. The first was to understand how best to evaluate and forecast the condition, capacity and military value of infrastructure; and the second was to determine a means to track progress and measure the effectiveness of a DoD enterprise-wide lifecycle infrastructure management strategy.

The first objective of this working group

was to *assess the ability of the current defense infrastructure data processes (elements, accuracy, frequency of update, level of detail) to support the DoD corporate infrastructure decisions*. Data gaps exist making metrics development a difficult task. The units of measure and the naming conventions cause part of this issue. For example, it may be more beneficial to use "ship equivalents" for piers and "aircraft capacity for airfield" thus making the measure meaningful to all levels rather than just functional area managers such as engineers or master planners. Also, there needs to be more emphasis on meta-data (data about data), data sharing and interoperability of data among Services. Finally, there is the data lag that inhibits planning. At times, the vintage of the data is so old that using it for planning is virtually worthless as it gives an inaccurate picture of the current situation. The final key point is that infrastructure needs to be linked directly to the mission essential tasks in systems such as DRRS. Today, infrastructure is looked upon in a support role and not as part of the production function for war fighting.

The second objective of this working group was to *establish a dynamic process of continuous measurement and performance improvement in support of the DoD enterprise-wide lifecycle infrastructure management*. The key to establishing a dynamic process of continuous measurements and performance improvement is getting a solid baseline from which to work. A major part of this baseline is the inventory. If this is not correct, then any measurements of this incorrect inventory will be flawed. The only real way to get the inventory straight is by doing a physical look at the infrastructure, i.e. by using "boots on the ground." This physical look must be part of a regular, established process thus ensuring accuracy of the baseline. Command emphasis is a must to maintain an accurate inventory.

Another issue addressed regarding this objective was who, in fact, actually "owns" the lifecycle process. Right now the DoD has many agencies that contribute to the lifecycle but no one office that is the lead agency and decision maker. It somewhat violates the "unity of command" principle and creates fragmented management of a vital process.

A final item looked at was the training of people. The DoD needs asset managers (See SPECIAL MEETING, p. 34)

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who are versed in many areas rather than people who are experts in only one field. We need to have asset managers rather than today's stovepipe approach to infrastructure management. The human capital side of the infrastructure lifecycle process has not been addressed well and needs to be fixed.

The third objective this group addressed was to *develop techniques for measuring installation efficiencies*. One idea is to identify installations that are running well and use them as a model and baseline from which to measure. One method to identify these efficient organizations would be to conduct a survey on Base Operating Services (BOS). This DoD-wide survey should be web-based, and the idea is to get the survey out quickly to determine the baseline regarding how installations are currently performing. The survey should ask how satisfied people are with the BOS support functions as well as how important they are. Examples of BOS support function include bachelor housing, child care, recreation services, etc. Ideally, this survey could be institutionalized on an annual basis. Hopefully, a competitive spirit would evolve within the Services for their installations to provide the best customer service at the least cost. In this regard, further analysis could be done to see if there is a link between unit readiness and efficient installations.

No matter what measures are developed and adopted, they need to concentrate on the high cost BOS for the maximum payoff. Concerning this, it may take some investment in order to get a good payoff in the end. In other words, it takes investment dollars in order to save money. Take utilities for example. Utilities are high cost items and it may be worth while to install meters and add insulation on buildings in order to show consumption and eventual reduction in use.

World-Wide Basing Working Group

The purpose of this working group was to develop analytic methodologies and criteria to determine the contribution of DoD base locations to warfighting force effectiveness and efficiency measures. Briefings on *Strengthening Global Defense Posture and Forward Operating Site (FOS) and Cooperative Security Location (CSL) Cost Model* by LTC (P) **Doug Hersh** from OSD/PA&E set the tone for discussions on future basing decision criterion such as mul-

tiple small bases in strategic locations and reliance on CONUS reach-back capabilities for operations.

Base location value is a function of many criteria. The main criterion is the host country's political relationship, including treaties, and agreements with the United States. The FOS & CSL Cost Model is a tool to provide a rough cost figure for future security arrangements based on DoD facility costing guides by location and force size estimates.

Dr **Ron Garvey** briefed a RAND Project Air Force work on analyzing agile combat support for the Air Expeditionary Forces (AEF). RAND's analytic methodology involves choosing a scenario with combat support and transportation requirements. Optimal locations minimize the facility operating costs and transportation costs to satisfy the time-phased demands for war readiness materiel resources for the expected operations in the scenario at the forward operating locations. While minimizing costs is important, efficiency goals are subsumed by effectiveness goals.

The main reason for world-wide military basing locations is to train and support a robust total military force capable of executing the national defense strategy. To that end, the analytic tools that seem most helpful in measuring effectiveness are decision analysis value-focused thinking and risk assessments. Ancillary tools to highlight possible future cost savings are: data consolidation activities, information display, information sharing activities, and analytical model building activities to improve common understanding of the issues, analyses of future courses of action, and synergistic decision making across services and activities.

Conclusions and Recommendations from the Synthesis Working Group

The Synthesis Group, with representatives in each working group, gleaned common concerns and observations. Synthesis Group findings cover data, databases and metrics, the Defense Readiness Reporting System (DRRS), infrastructure terminology, and risk.

Metrics, supported by accurate data, must inform the allocation or reallocation of infrastructure resources, and must underpin the linkage of warfighter capabilities down to specific mission infrastructure needs. The DRRS is a good starting point for the development of this linkage, but should be expanded to cover a broader planning hori-

zon. The database needed should take the form of a Service Oriented Architecture (SOA), a net-centric means of providing current, discoverable, configuration controlled data for display and manipulation by a wide range of users in a web-based environment.

Data classification presents its own challenges. Installation data is generally unclassified but at some level of aggregation becomes classified. Operating in a classified environment is difficult for many in the infrastructure community, so premature or over-classification should be avoided.

It is important to note that this common database requires an agreed upon lexicon of infrastructure definitions, some very technical, to ensure that the data present is consistently understood and used across the DoD community. This is discussed more in subsequent paragraphs focusing on Service differences.

The Navy's current approach may be a useful example for the other Services. The explicit framework linking infrastructure components to warfighting missions and the core business model should be further developed and explored.

Service differences, mentioned earlier, will clearly influence the way Services think about and measure infrastructure performance. Differences between the Services, OSD, the Joint Staff and the Combatant Commands (COCOMs) further complicate the creation of an acceptable common framework for defining and managing infrastructure, but it is in the best interest of all to work together to arrive at meaningful common ground.

Finally, the Synthesis Working Group found that risk, while acknowledged as an important consideration in infrastructure decision making, was addressed only briefly. The recent MORS Capability Based Planning: Identifying, Classifying and Measuring Risk in a Post 9-11 World workshop (CBP II) also just touched on risk, although risk was in the title of the workshop. The CBP construct does provide a helpful means for illuminating risk: many different scenarios, or alternate futures, provide multiple lenses through which to view the performance of an infrastructure portfolio in different situations. A Red Team approach to exploring the implications of different scenarios on current and future infrastructure and force structure portfolios could provide decision makers a more concrete way to come to grips with the implications of resource allocation decisions. This Red

Team approach may illustrate the importance of flexibility as a way to reduce the risk of negative outcomes across a broad range of scenarios. Scenario likelihood may be thought of as possible, probable, likely, plausible and implausible. An implausible scenario often provides a useful worst case bound on negative outcomes.

A Way Ahead

As the Synthesis Group documented its findings, it seemed that a helpful additional contribution would be a way ahead for both MORS and the infrastructure community represented at the workshop. To this end, the Synthesis Group developed and presented a way ahead that illustrated how the workshop results could be brought to bear on DoD infrastructure decision making by viewing the DoD infrastructure as a portfolio.

Quantitative portfolio analysis and management is a well developed technique, and its application to the DoD infrastructure challenges revealed at this workshop is a reasonable next step for MORS and the workshop participants. The analytical community can significantly help the DoD by developing the methods to quantify the value of infrastructure to the warfighter's production function, and help get these methods incorporated into appropriate planning models. A real challenge is in leadership commitment and cooperation between organizations. While advocacy by the MORS Sponsors is important, even more important is advocacy by the DoD infrastructure decision makers present on the first day of the workshop. These senior officials are the ones that must champion data and lexicon standardization, database (SOA) development, process enforcement and governance. First and foremost, a collaborative partnership between the Service and higher headquarters stakeholders is much more likely to succeed than a top down directed force fit solution.

Additional Key Contributors

- **Mike Larkin**, Office of the HQ USAF A9, Technical Co-Chair
- **CAPT Jerry Manley**, Office of the CNIC, Technical Co-Chair
- **Dr Niki Goerger**, Dept. of Systems Engineering, USMA, MORS Bulldog
- **LTC Lee Ewing**, PhD, Operations Research Department, Naval Postgraduate School, WG 1 Co-Chair
- **Mike Hix**, RAND, WG 1 Co-Chair
- **Dr Ellen Pint**, RAND, WG 1 Co-Chair

- **Tom Liedke**, Office of the US Army Assistant Chief of Staff for Installation Management, Facilities and Housing Directorate, WG 3 Co-Chair
- **Tom Wegleitner**, Program Manager, VISTA Corporation, WG 3 Co-Chair
- **COL Darrall Henderson**, Dept. of Mathematical Sciences, USMA, WG 4 Co-Chair.

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Biographies

Colonel Tim Trainor received his MBA from Duke University and his PhD in Industrial Engineering from North Carolina State University. He received his undergraduate degree from the United States Military Academy in 1983. He is currently the Head of the Systems Engineering Department at the United States Military Academy. He has served in various command and staff positions in the Engineer branch of the US Army during a 24-year Army career.

Dr Lee Lehmkuhl is a Principal Modeling and Simulation Engineer with The MITRE Corporation in Colorado Springs, providing analysis support for system acquisition and strategic planning at Air Force Space Command. He joined MITRE upon retirement from the Air Force after a 20 year career as a Scientific Analyst. Dr Lehmkuhl taught Operations Research at the Air Force Institute of Technology and the United States Air Force Academy. He currently serves on the MORS Board of Directors.

Dr Robert F. Dell is an Associate Professor of Operations Research at the Naval Postgraduate School. Since 1990, he has taught and applied optimization to a variety of military problems and received continuous support for Army Base Realignment and Closure. He has received additional research support from every uniformed service for topics ranging from naval capital planning to Coast guard cutter scheduling. He has also applied optimization in the private sector in areas ranging from production scheduling to supply chain design. His research appears in many open literature publications. He recently received a Special Army Payne Award for excellence in operations research for his contributions to the 2005 Army BRAC Analysis.

Dr Chien Huo is the Chief of Future Infrastructure Analysis in the Office of the Assis-

tant Secretary of the Army (Installations & Environment). His previous experiences include the 2005 base realignment and closure (BRAC) analysis, development of several six-year resource projections for Army installations and resources decision support tools for the Headquarters Army Staff, policy analyst, project manager, and data administrator for the office of the Under Secretary of Defense (AT&L). Dr Huo brings with him 33 years of experience in government, academia, and the private sector. He received his M.S. and Ph. D. in Applied Mathematics from Brown University, and his undergraduate engineering degree from the National Taiwan University

Ms Corinne Wallshein is currently in an Air Force career broadening position, working in the Force and Infrastructure Cost Analysis Division in OSD/PA&E. Previous experiences include 2005 BRAC analysis, studies of Air Force infrastructure, and studies on national strategic and tactical command, control, and communications. She is currently pursuing a doctorate in Information Technology at George Mason University, with software cost estimating as her research topic. An ardent supporter of MORS, she serves on the Board of Directors. ☼

MORS PRESIDENT

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the MORS Member Survey. The results of the survey are helping the society better meet the desires of its members.

- **Pat Allen** discussed the efforts of his Web Enabling committee to improve the Society's use of the web and to bring more capabilities to our membership via the web. Under his leadership, the committee collected requirements from across the Society, assessed alternative implementation options, and developed a comprehensive implementation plan. The "bulbs planted" by his committees will be "blooming" over the next year.

Get Involved With Your Society

We are working numerous initiatives (e.g., Community of Practice, Web Enabling, mentorship, etc) to increase the value of the Society to its members. I encourage you to get involved with your Society to further these and several other initiatives. Don't know where to start or what you might be able to do? Please contact me, any member of the BoD, or the MORS office and we will help you help your Society. ☼