

Operation Iraqi Freedom

CNA's formal reconstruction of Operation Iraqi Freedom (OIF) will be complete at the end of September, though we expect to continue mining the data in various follow-on projects. Thus far, briefings have been prepared on the following topics:

- OIF planning from the perspective of Central Command
- How the Navy got its forces to the fight
- The targeting processes used by the Combined Air Operations Center (CAOC), the ways those processes changed in response to key events, and the effectiveness of various targeting methods
- The effectiveness of methods used against time-critical targets
- Factors contributing to a fratricide incident
- Combat system interoperability
- Tomahawk employment and performance
- Air wing support of ground operations
- Aircraft carrier sortie capacity
- Naval management of bandwidth and other communications resources
- Political-military relations during OIF from a naval perspective
- Preparations to defend Bahrain against chemical and biological weapons.

(Ms. Maureen A. Wigge, (703) 824-2490)

Developing metrics for Navy transformation

The Commander, Navy Warfare Development Command asked CNA to examine past successful transformations in an effort to develop metrics for Sea Trial, the fleet-led innovation and experimentation process supporting the Navy's current warfighting transformation. We examined the developmental efforts supporting the Maritime Strategy in the 1980s, the Navy's efforts to support tactical operations with strategic national sensors, and Germany's efforts to transform its land warfare capabilities after WWI. All three efforts followed a pattern consisting of a vision, goals, challenges, potential solutions, experimentation, and feedback. The "challenges" arose from a comparison of capability goals and the current capabilities baseline. Once the challenges were clearly articulated, the appropriate metrics were usually obvious.

We applied what we learned from these transformations to developing Sea Trial metrics. We found that: (1) The Navy has been successfully transforming itself for more than 200 years. These transformations are well documented and followed a predictable pattern. Today's transformation can take advantage of that pattern and the way metrics were used. (2) Sea Trial should have two sets of activities—preparation and experimentation. (3) Two kinds of quantitative metrics are important for the management of Sea Trial—process metrics and value metrics, which will be clearer as the challenges for Sea Trial become better articulated and accepted. (4) Value metrics for the Sea Trial process differ from the metrics used in individual experiments to assess potential solutions. Value metrics must reflect the progress made toward overcoming a challenge. The metrics used in individual experiments arise from the unknowns associated with a potential solution. (Dr. Ralph Passarelli, (703) 824-2617)

Top Officials 2 (TOPOFF 2)

TOPOFF 2 was a major homeland security exercise for which planning began before September 11, 2001. It simulated federal, state, and local responses to near-simultaneous “terrorist attacks” in the Chicago and Seattle metropolitan areas. CNA helped plan and execute TOPOFF 2 and is analyzing the results. There were 8,400 participants, hundreds of data collectors, and about a dozen CNA analysts involved. We are applying the same methods to TOPOFF we have traditionally used to analyze exercises—and real-world events—for the Navy and the Marine Corps: reconstruction, followed by analysis. The reconstruction creates a fact-based, unified, synchronized, deconflicted, and meaningful account of what happened, without pre-judgment as to what is important. The analysis targets six areas chosen for their importance in September 11, the follow-on anthrax attacks, and previous exercises. (Mr. Dwight Lyons, (703) 824-2595)

Naval Capability Development Process

The Naval Capability Development Process is N6/7’s program of analysis of potential trade-offs among the Sea Power 21 pillars—Sea Shield, Sea Strike, Sea Base, and FORCENet. This year we focused on three of those pillars. (1) *Sea Shield*. We addressed three issues: the level of Sea-Based Terminal Missile Defense the Navy could provide in the medium term and the implications for other Navy missions; the potential benefits and drawbacks of a new extended-range, ship-launched air-defense missile; and the new organic capabilities an Expeditionary Strike Group (ESG) would need to operate in a high-threat environment, or, conversely, the environments an ESG could operate in as it is currently envisioned. (2) *Sea Strike*. We explored the differences between “win decisively” and “swiftly defeat the efforts” objectives in a specific Asian campaign, paying particular attention to possible differences in strike target sets and ordnance expenditures. We received valuable input from virtually every relevant command in the Pacific theater. (3) *FORCENet*. We helped prioritize programs so as to receive the greatest increase in warfighting capability per dollar

invested. Our work for the fleets on bandwidth management in recent years suggests efficiencies that can be used to stretch capacity and reduce the need for new investments in satellite constellations. (Dr. Del Gilmore, (703) 824-2258)

Relating amphibious lift and forcible entry

N75 asked us to address the amphibious portions of expeditionary warfare and to help tie together other studies addressing specific parts of expeditionary warfare capabilities. Because many of the current issues are directly related to establishing and operating a sea base, seabasing is a central theme of the study. One of our major efforts has been helping develop the Seabasing Mission Capability Package (MCP). This quarter, we helped the MCP team navigate through several models, simulations, decision tools, and development efforts that attempt to support seabasing. The result looks a bit like the patchwork it was based on. We have developed an alternative approach that would combine CNA’s analytical expertise with one of the better decision support software designers to create an integrated set of seabasing assessment tools. Both OPNAV and the Marine Corps Combat Development Command have expressed interest in this effort. (Mr. Dwight Lyons, (703) 824-2595)

Maritime Prepositioning Force-Future

Our work thus far on the Maritime Prepositioning Force-Future (MPF(F)) analysis of alternatives (AoA) has identified several issues key to the Naval concept of seabasing. In addition to the traditional AoA tasks of developing and evaluating ship designs to support a USMC combined-arms, brigade-size task force, we are: (1) developing measures of the amount of sustainment needed to support forces operating ashore in a combat environment and measuring the ability of the sea-based rotary-wing and tilt-rotor aircraft to ferry those supplies to the units ashore; (2) examining the limiting factors in the closure, assembly, and integration of the Marine brigade and Naval support element from the United States to the MPF(F) sea-based ships, and proposing and evaluating alternatives to the traditional use of strategic lift aircraft; and (3) analyzing the operational effectiveness of “hybrid” MPF(F) and amphibious force combinations and comparing the results to traditional, amphibious-only assaults. An

additional challenge is to use the ship-to-objective maneuver as a basis instead of the WWII-style “storm the beaches.” We are also examining ship design alternatives that include a range of capability options, including the basing of rotary-wing, tilt-rotor, and VSTOL JSF aircraft on the MPF(F) squadron of ships. (Mr. Dwight Lyons, (703) 824-2595)

Auxiliary Dry Cargo Carriers

In 1992 N42 developed a mission needs statement (MNS) for an Auxiliary Dry Cargo Carrier that covered both station-ship and shuttle-ship missions. N42 has now asked CNA for an analysis of alternatives for the T-AOE(X). When the T-AOE(X) Integrating Integrated Product Team (IIPT) met to receive approval to enter concept refinement and formally begin the AoA, the outcome was less than optimal. OSD AT&L asked to be briefed further on the history of the program, on how T-AOE(X) fits into the bigger Naval picture, and in short, why the program office was using a 12-year-old MNS to justify a new start program.

N42 asked CNA for a second briefing, telling the “T-AOE(X) story.” We showed that, since 1992, six major studies have examined the station-ship requirement. All of these studies addressed different conditions, yet all concluded that at least 8 AOEs and/or T-AOEs are needed. The IIPT members seemed pleased, and the sponsor has developed a draft initial capabilities document with our results attached. The sponsor hopes this will suffice and the AoA can begin soon. This chain of events is another illustration, along with MPF(F) above, that the AoA process is changing and that we are changing with it. In the new system, preparations leading to the AoA may be as important as the AoA itself. (Mr. Dwight Lyons, (703) 824-2595)

Computer replacement cycles

The Marine Corps has no published policy for the replacement, or “refresh,” of its computers, but in the past has generally adopted “industry best practice,” which usually followed a three-year cycle. This cycle is no longer universally applicable. The commercial sector is finding that computers continue to provide satisfactory performance for longer periods; companies have either adopted a four- or five-year cycle or are taking a wait-and-see attitude. The U.S. Army has

specified a five-year review cycle for computer re-procurement. In this study for the Marine Corps Systems Command, we are analyzing what the Marine Corps’ policy should be. We are looking at the issues that affect the refresh rate and will propose a policy and set of guidelines the Marine Corps can provide to programs acquiring off-the-shelf computers. (Contact: Mr. Dwight Lyons, (703) 824-2595)

Changing strength ceiling metrics

The Conference Committee for the Defense Authorization Bill is considering a major change in how the Hill monitors military personnel strength, specifically, whether to switch from imposing a Congressional ceiling on personnel endstrength to one on average strength. The Senate has supported such a change; the House has opposed it. Over the past few years, CNA analysts have examined the merits of such a change and suggested the importance of distinguishing between using average strength for programming and budgeting and actually executing it. The potential advantages of the average strength metric are in budgeting because it aligns pay and benefits with expected number of people, but, in execution, correcting deviations in average strength can create significant variances from month to month and across years, particularly if numbers fluctuate during the peak summer recruiting months. There is little time left in the year to return the average to its goal.

A House staffer asked us for advice on how to draft a compromise for the conference language; the initial compromise language would have required the services to meet both average strength and endstrength targets. The staffer asked for our recommendations on the current language. After pointing out the problems with this proposal, we offered an alternative, stressing the distinction between budgeting and execution goals. At this point, the final outcome is unclear. (Dr. Henry Griffis (703) 824-2208)

Moving command ships to MSC

CNA has estimated savings of more than \$80 million a year by using civilians for operating and supporting four Navy command ships. Our estimates used civil service mariners for ship control, deck, engineering, commissary, and food service functions. The

embarked command staff would continue to be military, and military personnel would continue to do staff support functions. The savings come from removing 75 percent of the Navy officers and 70 percent of the enlistees from the operating crews and replacing them with a civilian crew with 45 percent fewer people. We estimate that this mixed manning would save between \$18 and \$20 million annually for each of two small AGF command ships and between \$20 million to \$28 million for each of two larger LCC command ships. A one-time investment of about \$12.4 million is needed to modify each LCC. The study influenced the Navy's decision to start moving one command ship to the Military Sealift Command (MSC); a second command ship is also likely to be moved. The Navy has not made a decision on the final two command ships. (Mr. Jack Keenan, (703) 824-2287)

Forward deployment analyses

Forward deployment analyses provide Navy and Joint staffs and decision-makers with an appropriate, tailored historical context of key contemporary issues. They also draw conclusions and make analytically based recommendations for current and future policy decisions. As such, they complement other ongoing Navy study and analysis efforts, including related CNA studies, OPNAV's recently established Task Force History, the Naval War College's new Maritime History Department, and the work program of the Contemporary History Branch of the Naval Historical Center.

This project, sponsored by the Naval Historical Center and overseen by N51, grew out of CNA's analysis of the Navy's historic role in smaller-scale contingencies and military operations other than war. That study discussed the enormous variety of the U.S. Navy's experience and identified flexibility as the most significant common theme in U.S. Navy history. It showed that, far from being a service wedded to tradition, past glories, and vast fleets, "at one time or another, the U.S. Navy has tried almost every possible way of procur-

ing, organizing, deploying, and employing ships and aircraft." The current study continues in that vein; recent areas of analysis include: the Navy's deployment strategy, its evolving relationship with the Marine Corps and Coast Guard, the Navy as a joint partner, and the Navy and homeland defense. (Mr. Peter Swartz, (703) 824-2876)

Analyst publishes book on estimating acquisition costs

CNA analyst, Matthew Goldberg, coauthored a book on estimating acquisition costs with Anduin Touw of Boeing Corporation. In that book, *Statistical Methods for Learning Curves and Cost Analysis*, the authors take a fresh look at the statistical methods used by cost analysts in government, industry, and in studies and analysis. Many of these methods were developed decades ago, before the advent of modern computer hardware and software capable of directly estimating nonlinear models. Newer methods, adopted from the recent statistical literature, have stronger theoretical foundations and more robust statistical properties. And, the newer methods are scarcely more difficult to apply given modern computing power. Goldberg and Touw identified optimal estimation methods for learning curves and cost estimation relationships and applied the techniques to costs with a range of characteristics and for a range of underlying modeling assumptions. They used several criteria to choose among the estimation methods and found that some methods systematically overestimate the cost of the first unit and underestimate the costs of latter units. (Dr. Matthew Goldberg, (703) 824-2455)

John Clifford receives award

For the past year, Dr. John Clifford served as CNA's full-time scientific analyst at N81 and contributed to major analytical efforts. In September, John left this assignment to become the CNA analyst at Sixth Fleet. Shortly before leaving, in recognition of his work at N81, he received the Navy Meritorious Public Service Award from RADM Sestak.