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**CNA**  
ANALYSIS & SOLUTIONS

70<sup>th</sup>  
2012  
Anniversary

2012 Year in Review

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# CNA

As CNA concludes the celebration of our 70th year, we reflect on the pivotal roles our analysts have played—and continue to play—in supporting our military and government leaders in their important work at home and abroad. From World War II to the war in Afghanistan, from homeland security to education, on site in locations across the country and around the world, CNA analysts have always been, and remain, out in front when it counts, delivering analytical excellence. To honor those efforts, we've expanded this 2012 Year in Review to include highlights from our past that stand as milestones of our 70-year history and that are the foundation of our work today.

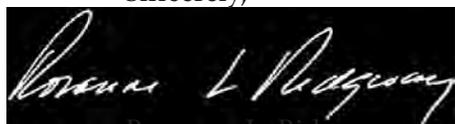
In 1940, President Roosevelt created the National Defense Research Committee to enlist the aid of scientists in improving U.S. military preparedness. CNA, which was founded in 1942 as the Antisubmarine Warfare Operations Research Group (ASWORG), is a descendant of that approach to research. ASWORG set a precedent among research organizations by putting its analysts on site to assess matters first hand and help find immediate practical answers to operational problems. By the end of World War II, nearly half of CNA's 80 analysts were assigned to various operating commands worldwide, and CNA's field program was firmly established as one of the most effective tools in the emerging scientific discipline of operational analysis.

Now, as then, our field program is one of the characteristics of CNA that sets us apart. Serving as the Federally Funded Research and Development Center for the U.S. Navy and Marine Corps, CNA's Center for Naval Analyses continues to deploy research analysts to the field where they can observe conditions on the ground, at sea, and in the air. And through CNA's Institute for Public Research, our analysts serve on the front lines of some of the most pressing issues facing Americans here at home: education, homeland security, cyber security, new media, health care, air traffic management, energy, and the environment.

This diverse research agenda is carried out by a world-class staff of professionals that includes statisticians, political scientists, economists, chemists, physicists, engineers, and many more disciplines. Whether on foreign battlefields or inside city council chambers, our analysts give military and other government leaders the information and insight they need to make informed decisions and take effective action. It is their work that is highlighted here—work that defines our success and continues CNA's 70-year tradition of analytical excellence.

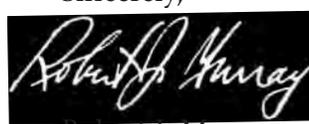
Thank you for taking a moment to review our efforts, and special thanks to everyone at CNA for their dedication to our work and to assisting our sponsors.

Sincerely,



Rozanne L. Ridgway  
Ambassador (Ret.)  
Chair, Board of Trustees

Sincerely,



Robert J. Murray  
President and CEO



# contents

## Table of Contents

<b>1</b>	<b>History</b>
1	Always Out in Front...at Home, Abroad, in the Community
2	Timeline Highlights
<b>4</b>	<b>The Field</b>
4	Joint Lessons From a Decade of War
4	Lessons From Advisors With Independent Afghan Army Units
5	Bold Alligator 2012
5	Exercise Ssang Yong 2012
6	Mimicking Live Fire
6	Training for Common Tactical Picture Proficiency
<b>7</b>	<b>Regional Interests</b>
7	The Long Littoral
7	China's Claims and Strategy in the South China Sea: What are the Implications for the U.S. Navy?
8	The Chinese Navy: Expanding Capabilities, Evolving Roles
8	The United States, Vietnam, and the Influence of the Dragon
9	Workshops on Maritime Security in East Asia
9	North Korea After Kim Chong-il: Leadership Dynamics and Potential Crisis Scenarios
9	Maritime Flashpoints in the Eastern Mediterranean
10	Irksome and Unpopular Duties: Pakistan's Frontier Corps
10	Future Marine Corps Posture in the Pacific
11	Iran's Basij Militia
11	Blood, Drugs, and Cartels in Guatemala
12	North Africa and the Sahel: Implications of the Arab Awakening
<b>13</b>	<b>Strategy and Operational Concepts</b>
13	U.S. Navy Capstone Strategy Documents and Context (1970-2010)
13	The Big Picture: What is the Best Strategy?
14	Scanning the Horizon: Implications for Navy Strategy
14	The Marine Corps Returns to the Sea
15	Can the Navy Help Make Piracy Fail?

# contents

<b>16</b>	<b>Wargaming, Experimentation, and Data</b>
16	Wargame: Operational Wraparound
16	Better Decision-Making Through Wargaming
17	Building the Marine Corps of Tomorrow Through Experimentation
17	Historical Fleet Employment Database Project
<b>18</b>	<b>Energy and the Environment</b>
18	The “Strait” Truth on the Flow of Oil
19	Estimating the Effects of Climate Change on Installation Energy Use
<b>20</b>	<b>Education and Training</b>
20	Measuring and Improving Teacher Effectiveness
20	Enriching Outcomes for Low-Income Children
21	Finding Innovative Ways to Offer Challenging Courses
21	Reducing Students’ Nonproductive Waiting Time
22	Helping the Marine Corps Adapt to the “Post-Afghanistan World”
<b>23</b>	<b>Cyber Concerns</b>
23	Science and Technology for Communication and Persuasion Abroad
23	Cyberterrorism
24	Cyber Mission Assurance
25	Testing a New Computer Security System
25	Using New Technology to Increase Ships’ Bandwidth
<b>26</b>	<b>Acquisition, Infrastructure, and Readiness</b>
26	Towing, Salvage, and Rescue Ship Replacement
26	The Navy’s Laydown and Dispersal Process
27	Can the Navy Shrink Its Shore Footprint?
27	Future of Biometrics
27	Modeling Ship Expected Service Life
28	Effects of New Aircraft Type-Model-Series on Operation and Maintenance Costs
<b>29</b>	<b>Manpower and Personnel</b>
29	The Fitness Report System for Marine Officers
29	Characterizing the Economic Prospects of Veterans

# contents

30	Recruiting Non-Citizens
30	The Costs and Benefits of Converting to Lump-Sum Selective Reenlistment Bonuses
31	How Effective is Sea Duty Incentive Pay?
32	An Analysis of Navy Recruiting Goal Allocation Models
<b>33</b>	<b>Military Tactics and Weapon Systems</b>
33	Adaptive Tomahawk Fires
33	Improving Night Vision
34	How Would Contamination of Marine Corps Aircraft and Ground Units Affect an Operation?
<b>35</b>	<b>Homeland Security and Justice</b>
35	National Preparedness Report
35	Postal Exercise Series
35	Evaluating Critical Law Enforcement Incidents
36	Using Agricultural Screening Tools in a Disease Outbreak
<b>37</b>	<b>Strengthening Health Care</b>
37	Ensuring the Safety and Well-Being of Long-Term Care Residents and Beneficiaries
37	Helping Sexual Assault Victims Through Sexual Assault Forensic Exams
<b>38</b>	<b>Support to the Federal Aviation Administration</b>
38	Modeling Air Traffic Delays for the FAA
38	Modernizing the FAA's Aeronautical Information Management Program
39	Where Can the Navy Exercise With Little Effect on Civilian Flights?
<b>40</b>	<b>2011 CNA Awards Day and Trustees Award</b>
40	2011 Phil E. DePoy Award for Analytical Excellence
41	2011 Mary Ann Pianka Award for Exceptional Service
41	2011 Board of Trustees Award
<b>42</b>	<b>CNA in the News</b>

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# history

“That [Philip] Morse’s group was an important factor in winning the war is fairly obvious to everyone who knows anything about the inside of the war.”

—Historian John Burchard on the Antisubmarine Warfare Operations Research Group (ASWORG), the group that became CNA, on the pivotal role operations analysts played in World War II.  
(John Burchard. *Q.E.D.: MIT in World War II*. MIT Press, 1948.)

## Always Out in Front...

CNA was founded on a methodology, that became a tradition, of following the data. From its earliest years, in World War II, when analysts deployed with the U.S. Navy to address the German U-boat threat, throughout seven decades of observing and analyzing combat operations (including World War II, Korea, Vietnam, the Persian Gulf, Afghanistan, and Iraq) and disaster relief operations (including New York City, New Orleans, Haiti, and Japan), CNA has provided on-site analytical support to high-level government officials. Whether CNA researchers are analyzing combat operations, designing and evaluating exercises, or supporting disaster relief efforts, the data drive the CNA mission.

## ...at Home, Abroad

CNA’s tradition and methodology of following the data began in World War II, when in 1942, U.S. Navy Captain Wilder Baker asked MIT Professor Philip M. Morse to lead a new group, ASWORG (Anti-Submarine Warfare Operations Research Group), which would send civilian scientists out to sea with sailors. ASWORG, CNA’s parent organization, was a pioneer in the field of operations research.

The tradition of sending scientists into the field to gather data informs every research project conducted by CNA. Analysts have been on-site for every major conflict since World War II, and CNA has expanded this model to provide analytical support positions to U.S. federal agencies and to military commands all over the world. CNA field representatives may be on long-term assignments—stationed at Navy, Marine Corps, or Joint commands; the Department of Homeland Security; the Federal Aviation Administration; or at a state department of education, for example—or they may have shorter assignments that include designing and observing an exercise that trains government officials to deal with a terrorist attack or a disease outbreak; or providing temporary support to federal or military officials in the aftermath of a natural disaster.

## ...in the Community

CNA’s charitable and volunteer efforts reflect a strong commitment to local communities. The work includes clothing and food drives, book sales, raffles, winter coat drives, disaster relief work, school supply and holiday gift drives, a scholarship program for a local high school, and a tutoring program for a local elementary school.

CNA supports organizations including the Arlington-Alexandria Coalition for the Homeless, the Salvation Army, Reading is Fundamental, Children’s Hospital, Alive! and the Virginia Women’s Shelter.

CNA is one of just two nongovernment agencies that participate in the federal government’s Combined Federal Campaign (CFC) for the National Capital Area, which raises money for charities all over the United States. CNA employees donated more than \$135,000 to CFC in 2012.

## World War II:

After successfully deploying its analysts with the Navy to gather U-boat data, the Anti-Submarine Warfare Operations Research Group (ASWORG) sends 50 analysts to commands around the world.

1942

During the Korean War, OEG analysts work in the field collecting data, solving tactical problems, and recommending improvements in procedures. Dr. Irving Shaknov dies when his observation plane is shot down during a mission—the only CNA analyst to lose his life in the line of duty.



Dr. Irving Shaknov

1950s

1952

CNA analysts work with the Office of the Chief of Naval Operations to develop plans for the naval quarantine of Cuba.

1962

CNA sets up a Red-Side Operations Analysis section to analyze Soviet naval operations, capabilities, and limitations.

1970s

CNA analysts make up 40 percent of the staff of the Gates Commission studying the feasibility of an all-volunteer force.

1973

1945



To reflect its work beyond antisubmarine warfare, ASWORG is renamed the Operations Research Group. At war's end, it is renamed the Operations Evaluation Group (OEG), and its work is administered by the Massachusetts Institute of Technology.

late 1950s

OEG and the Institute for Naval Studies join to form the Center for Naval Analyses (CNA), which is administered by the Franklin Institute until 1967 when the University of Rochester takes over the CNA contract.

1960s

1965

CNA establishes the Southeast Asia Combat Analysis Division, expanding CNA's field presence and increasing direct support to naval operating forces.





In October 1990, CNA becomes an independent organization operating under a direct contract with the Department of the Navy.

1990s

Twenty field representatives provide support to naval commands during the first Iraq war. After the war, CNA is designated the Navy's lead agency for collection and analysis of data related to Desert Shield/Desert Storm.

1991

1993



CNA establishes the Institute for Public Research to carry out non-DOD work. Early IPR clients include the Federal Aviation Administration, the Commission on National and Community Service, and the Carnegie Corporation.



2012

1980s



The Advanced Technology Program and the Strategic Policy Analysis Group are established, as are tactical analysis teams to support Second Fleet and Third Fleet. In 1983 the Hudson Institute assumes management of CNA.

2000s

Eighty-five CNA analysts deploy to combat areas to support U.S. efforts in Iraq and Afghanistan. At home, the Center for Naval Analyses provides analytical support for post-Hurricane Katrina relief efforts, and the Institute for Public Research works with Louisiana officials to prepare for future hurricanes.

2010



CNA analysts in both the Center for Naval Analyses and the Institute for Public Research support Navy relief operations following the Haiti earthquake, and, following the earthquake and tsunami in Japan, support the humanitarian assistance effort, Operation Tomodachi.

# field

## The Field

### Joint Lessons From a Decade of War

Two CNA field representatives assigned to the Joint and Coalition Operational Analysis (JCOA) division of the Joint Staff played a key role in that organization's "Decade of War" study. Officially named Joint Adaptation and Innovation (JAI), this effort to compile the enduring lessons learned from the past decade of military operations was requested by the Chairman of the Joint Chiefs of Staff. JCOA, with a CNA field representative serving as the senior analyst, reviewed and synthesized the 44 studies conducted since the organization's inception in 2003 and captured enduring lessons learned from joint military operations. These findings cover not only major combat and counterinsurgency operations, but also humanitarian assistance, disaster relief, defense support of civil authorities (DSCA), and threat studies. The results were broken down into eleven overarching themes and included specific recommendations for the way forward. The JAI results served as the framework for a Joint Staff-sponsored Decade of War conference, were provided to a General Officer Steering Committee session, and will be a key input to inform future Joint Force development planning.



### Lessons From Advisors With Independent Afghan Army Units

As the Marines draw down their forces in Afghanistan, many partnered Afghan National Security Forces will be left independent and supported through advisors. By late 2012, the main effort focused on small advisor teams embedded with unpartnered Afghan detachments, with Marine battalions in overwatch. CNA's field representative with the 2nd Marine Expeditionary Force (Forward) deployed to Afghanistan, interviewed current advisors, and derived some key lessons and recommendations. The recommendations included: adopt an advisory mindset at all levels; give the Afghan National Army its own battlespace; allow and enable the Afghan soldiers to conduct counterinsurgency in their own way; use advisors to maintain situational awareness and influence the Afghan National Security Forces on the ground; test the Afghan army's ability to operate independently; provide overwatch; further integrate Marine advise-and-assist efforts with those of NATO Training Mission-Afghanistan; and focus more on building the security forces' capacity and higher-order capabilities.

## Bold Alligator 2012

Bold Alligator 2012 was a major Navy and Marine Corps amphibious exercise off the east coast of the United States, augmented by coalition forces from the UK, France, the Netherlands, and Canada. The first east coast exercise of its kind in many years, Bold Alligator is considered by the services as a landmark in the re-invigoration of naval amphibious operations capability. CNA field representatives and analysts from CNA headquarters recently completed a reconstruction that documents the flow of forces, ship-to-shore movement, and command and control of the maritime forces. Issues highlighted in the reconstruction include: carrier strike group integration, fuel shortfalls for the Marine Expeditionary Brigade assault echelon operations, seabasing options for future exercises, the Single Naval Battle concept, and integration of live and synthetic forces.



## Exercise Ssang Yong 2012

Ssang Yong 2012 was the first Marine Expeditionary Brigade (MEB)-sized landing exercise to be held in the Western Pacific in recent history. CNA's III Marine Expeditionary Force field representative and one analyst from CNA headquarters supported the exercise. The analysts collected data and observations to provide insights on MEB command element operations and to assess the effectiveness of a new concept to facilitate communication between U.S. Marine Corps and Republic of Korea Marine Corps forces. The analysts compiled an after-action report summarizing observations and insights. One of the findings was that the structure of the exercise did not create an opportunity to test the new communications concept.



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## Mimicking Live Fire

Instructors at Marine Aviation Weapons and Tactics Squadron One use a combination of simulator and live-fire training events to train AV-8B pilots. Past analysis showed that metrics on Joint Tactical Air Control (JTAC) timing simulated in a Deployable Virtual Training Environment (DVTE) are not consistent with those from live-fire events. The JTAC timing metrics were routinely shorter in the DVTE, making the tempo of operations appear faster than it is in a live event. Recently, the CNA field representative calculated JTAC timing metrics from a close-air support simulator training event that networked the Supporting Arms Virtual Trainer with the AV-8B pilot training simulator. The analysis showed that the Supporting Arms Virtual Trainer linked to the AV-8B simulator benefited the overall training by enhancing the simulator curriculum and representing certain aspects of live-fire training accurately. Specifically, the times associated with JTAC actions in the linked training environment were consistent with those from live-fire events.



## Training for Common Tactical Picture Proficiency

Troops at the combat level use a “common tactical picture,” or CTP, of the battlefield to know what hostile, friendly, and neutral forces are doing at a given time. Having an accurate, complete, and timely picture is critical to success on the battlefield.

A hypothesis states that the training of individual operations specialists is one variable that influences the accuracy of the CTP. CNA’s field representative to Carrier Strike Group (CSG) Nine used a composite unit training exercise, which is a rehearsal of the CSG before a deployment, to collect data on personnel training levels and metrics for the common tactical picture. He then constructed a model of CTP accuracy that takes into account both operational and personnel factors. This work, using data collected while underway on USS *Abraham Lincoln*, is an initial attempt to analyze the importance of on-the-job training for tactical warfighting proficiency.



# regions

## Regional Interests

### The Long Littoral

In support of a grant from the Smith Richardson Foundation, CNA is examining security issues along the Indian Ocean/Western Pacific littoral. CNA has hosted a number of conferences and workshops, which have led to reports on each of the major maritime basins found along the greater Asian “long littoral” that runs from the Sea of Japan in the east, to the Arabian Sea in the west. The project explores the five great maritime basins of the Indo-Pacific: the Sea of Japan, the East China and Yellow seas, the South China Sea, the Bay of Bengal, and the Arabian Sea. The objective is to provide a

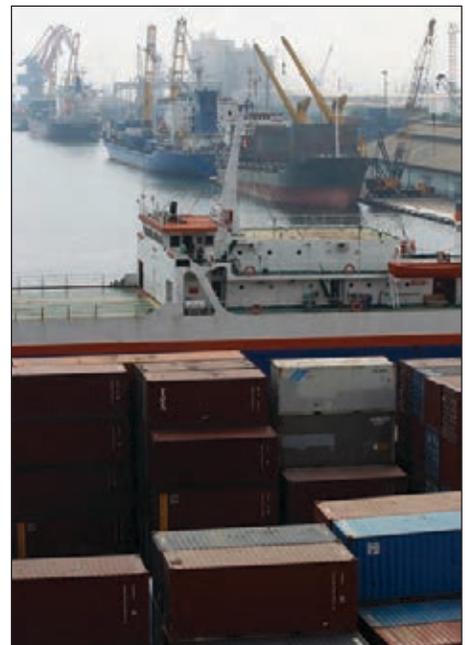
different perspective—namely, a maritime viewpoint—on the security issues that U.S. strategy must confront as it “rebalances” to a more maritime orientation focused on the Indo-Pacific littoral. The project also aims to identify issues that may be common to more than one basin but involve different players in different regions, with the idea that solutions that may be possible in one maritime basin may be applicable in others.



### China’s Claims and Strategy in the South China Sea: What are the Implications for the U.S. Navy?

The South China Sea is a focal point of maritime political and security issues in East Asia. Its location makes it strategically important to international trade, and it is rich in oil and natural gas. It is also the site of competing territorial claims and rivalry between China and its maritime neighbors.

Building on previous CNA research on China’s maritime issues, this project examines China’s strategic approach to the South China Sea with a focus on Beijing’s interactions with several of its maritime neighbors. The project provides a discussion and analysis of the complex dynamics between China and regional actors in the South China Sea and the implications for the U.S. Navy.



## The Chinese Navy: Expanding Capabilities, Evolving Roles

Few issues are as important to U.S. national security analysts as China's military modernization, a process that has benefited directly from China's past two decades of dramatic economic expansion. National Defense University Press published *The Chinese Navy: Expanding Capabilities, Evolving Roles* to address the Chinese navy—the People's Liberation Army Navy, or PLAN—the service that has most dramatically benefited from increased defense funding. The book includes two chapters by CNA experts. Chapter 1: "Rising Powers and Naval Power" was written by CAPT Peter Swartz (Ret.). Chapter 8: "The PLA Navy's Antiaccess Role in a Taiwan Contingency" was written by RADM Michael McDevitt (Ret.).

### Excerpt from Chapter 8: "The PLA Navy's Antiaccess Role in a Taiwan Contingency"

"...although Beijing's wartime antiaccess strategy must take into account U.S. Air Force bases in Okinawa, Guam, and potentially South Korea, the operational aspects of dealing with this problem are straightforward. Conventionally armed ballistic missiles have been used to attack fixed land targets since 1944, without much strategic or operational success because of small conventional explosive payloads and missile inaccuracy. Today, this situation is very different. In the era of global positioning system (GPS)-enabled precision weapons, attacking fixed land bases with ballistic missiles is no longer operationally challenging because air bases do not move. There is a reasonable expectation that, after launching GPS-equipped ballistic missiles at a specific latitude and longitude, the missile will hit very close to the intended geographic aimpoint."

## The United States, Vietnam, and the Influence of the Dragon

As memories of the U.S.-Vietnam War fade, relations between the two countries have quietly begun to flourish. Bilateral relations between the United States and the Socialist Republic of Vietnam have evolved rapidly since ties were normalized in 1995. One factor drawing the two countries together is the complex relationships both have with the People's Republic of China (PRC). A CNA study examined the China factor in the relationship between the United States and Vietnam and assessed the extent to which shared concerns over China both encourage and limit cooperation between the two countries.

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## Excerpt from: “The China Factor in U.S.-Vietnam Relations”

“An additional, and often unspoken, factor drawing the two countries together is their shared concerns over the rise of China. The PRC’s accelerated economic growth, increasing economic footprint, global search for natural resources, and rapid pace of military modernization have created a wide range of new challenges for decision-makers in Hanoi and Washington. The principal area where the United States and Vietnam share concerns over China’s ambitions is Beijing’s assertiveness in the disputed waters of the South China Sea. The United States has had a number of contentious encounters with Chinese naval and law enforcement vessels within China’s exclusive economic zone and is concerned about preserving the freedom of navigation in the international waters of the South China Sea. Vietnam, for its part, has an overlapping territorial dispute with Beijing over the South China Sea, marked by frequent incidents at sea, a few of which have led to brief hostilities. Consequently, Vietnam remains vigilant against China’s attempts to enforce its sovereignty claims.”

## Workshops on Maritime Security in East Asia

Because security concerns in East Asia have increasingly revolved around disputes and interactions in the surrounding seas, CNA’s Strategic Studies Division is hosting a series of workshops to explore maritime security in East Asia in depth. These workshops bring together recognized experts as well as the U.S. and Asian government officials responsible for managing these issues. In 2012, CNA held two of the workshops.



The first, on the Yellow and East China seas, explored sovereignty and economic disputes among the Northeast Asian nations that consider these seas their home waters. It also considered U.S. interests and the role of the U.S. Navy in those two seas. The second, Naval Developments in Asia, explored the interaction between China’s emerging naval capabilities and the consequent demand by other Asian states for submarines, anti-ship cruise missiles, and other means of protecting their maritime claims.

## North Korea After Kim Chong-il: Leadership Dynamics and Potential Crisis Scenarios

What would have happened if Kim had died in a period in which the regime had not worked out the succession? What kind of leadership configuration would emerge? Would the regime sustain itself or would it collapse into chaos? Before the death of the Supreme Leader in December 2011, this paper argued that the leadership configuration in place at the time and the circumstances surrounding Kim’s death would have a major impact on how regime dynamics evolved in the following weeks, months, and possibly years.

## Maritime Flashpoints in the Eastern Mediterranean

What are the chances that conflict and competition in the Eastern Mediterranean will manifest as a flashpoint, or potentially explosive situation, in the maritime domain? The Chief of Naval Operations (CNO) asked CNA to examine this issue.

The study team identified five possible sources of conflict in the region; assessed the key players, interests, and issues involved; and mapped potential paths by which each case could turn into a maritime flashpoint. The study also addressed the risks that a conflict could pose for the Navy. Not only is the Navy present in the area, but some of its key navy partners would be affected by most of the flashpoints. Thus, all of the flashpoints would likely impact U.S. Navy operations and any conflict has the potential to create demands for more forces and assets than are now in theater.

CNA's findings indicate that the CNO can use his roles in engaging naval leadership and promoting navy-to-navy relations to provide "good offices" in order to facilitate dialogue between opposing parties and reinforce messaging from the U.S. government to encourage regional actors to resolve any dispute before it turns into a conflict. CNA briefed the CNO and his staff on the study, ahead of the CNO's recent trip to the region. CNA is sharing the study and its findings with other combatant commanders and Navy leadership.

### Irksome and Unpopular Duties: Pakistan's Frontier Corps

As part of a project for Marine Corps Intelligence Activity, CNA's Strategic Studies Division analyzed the role of indigenous local security forces in settings outside Afghanistan. Across the border in Pakistan, government authorities have, since the late 19th century, organized, trained, equipped, and paid Pashtun



tribesmen to provide local security. The Frontier Corps is the most prominent of these groups. Under the British, the Frontier Corps was an instrument in a wider system of indirect imperial control. Since independence in 1947, Pakistan has employed the Frontier Corps to police the Afghan border and tribal areas and, in so doing, has helped free up the army to prepare for conventional military operations.

Through studying Pakistan's Frontier Corps, CNA identified two notes of caution that should be considered as the U.S. military and Afghanistan expand the Afghan Local Police and other irregular forces. First, it is essential that local forces remain local. Second, in neighboring Pakistan, as in many other conflict zones, military commanders often employ paramilitary and police units as adjuncts to combat forces, but irregular forces are rarely trained and equipped for warfighting, nor do they typically have the discipline of conventional ground units. High casualties (including among noncombatants), low morale, and desertion are the typical results of this operational misapplication.

### Future Marine Corps Posture in the Pacific

For the first time in decades, the U.S. Marine Corps is making significant changes to its forward-deployed posture in the Asia-Pacific region. Marine Corps Forces Pacific asked CNA to examine the implications of the coming changes and develop a phased approach to implement the new Pacific posture, given these implications. The phased approach that CNA developed integrates multiple existing phasing plans for the coming changes and includes a set of enabling actions which, once completed, will allow the Marine Corps to progress from one phase to the next.

## Iran's Basij Militia

Iran's Basij organization is a volunteer paramilitary force that engages in such activities as enforcing internal security, suppressing political dissent, and policing morals. The Basij is an adjunct of Iran's Revolutionary Guards and closely follows the guidance of Iran's Supreme Leader, to whom Basij members are intensely loyal.

As part of CNA's ongoing work on issues of national and strategic importance, a CNA analyst examined the internal dynamics of Iran's Basij militia. CNA's study focuses on the Basij's rank-and-file. It specifically looks at how individuals are recruited into the organization, what sort of incentives drive their participation, and what types of training they receive. In addition to Persian-language primary literature, the study is largely based on interviews with current and former Basij members. The study concludes with general observations about the organization, its internal practices, and its membership.



## Blood, Drugs, and Cartels in Guatemala

Contraband routes in Guatemala traditionally controlled by local groups are coming ever more under the control of the Mexican cartels. Around half of the nation's territory is believed to lack effective state control and is permeated by criminal organizations. For decades, criminal organizations have had influence over the Guatemalan police, army, courts and government; and in the cities, local gangs operate with shocking violence. However, Mexican cartels, with billions in drug profits, military grade weapons, and a taste for indiscriminate killing and brutality, have elevated these threats. Today, Guatemala and its neighbors Belize, Honduras, and El Salvador have homicide rates among the highest in the world. Guatemala's murder rate is as high as it was during the worst years of the civil wars in the 1980s. Impunity for traffickers and murderers is the rule, not the exception.



Drug trafficking networks operate most intensely in communities along or near smuggling routes, many of which are located in border regions. Guatemala has more than 800 miles of borders that cross forests and mountain ranges and are seldom monitored or even marked. The communities close to the borders tend to be rural and engaged in subsistence farming, often with little or no government presence in the form of clinics, schools, or police. Without the presence of state institutions, these communities are left vulnerable to exploitation at the hands of criminal groups, which use a variety of tactics, including not only threats and violence but also the distribution of money, public services, and other benefits to obtain compliance, acceptance, and even the support of local residents.

## Excerpt from “Criminal Organizations and Illicit Trafficking in Guatemala’s Border Communities”

“The Zetas operate differently. In contrast to other Mexican cartels, they are a criminal organization without geographic roots, and made up of individuals with no familial or regional ties upon which to base their loyalty. Because of their origins from Mexican special operations troops, and their emphasis on recruiting Guatemalan special operations troops, the Zetas’ structure, training, and tactics are fundamentally military—and special operations—in nature. They do not traffic product through Guatemala by paying local providers and cutting deals with a patchwork of regional capos. Instead, the Zetas penetrate a region and seize control by establishing intelligence, presenting offers and threats to whomever currently traffics in the region, and committing violence—often horrific violence either in its display of firepower or its cruelty—against those who do not subordinate their operations to Zeta control. Unlike traditional criminal organizations in Guatemala, which thrive in part by having the support of local communities and operate under low risk of interference, the Zetas operate by extorting, coercing, or killing local criminal groups into capitulation and, when necessary, by terrorizing local populations into silence.

The latest example of such an act was the May 2011 massacre and decapitation of 27 workers on a farm near the Mexican border in Petén. The Zetas left messages in blood on nearby walls, written with the severed arms and legs of their victims. Strategic communication, via messages pinned to corpses, bed sheets bearing messages hung from highway overpasses, or spectacular acts of violence, is another common aspect of Zeta operations.”

## North Africa and the Sahel: Implications of the Arab Awakening

Today, in stark contrast to most of the past century, long-standing authoritarian regimes in North Africa are no longer guarantors of stability. What began in Tunisia as protests for dignity and economic justice has spread across the Arab world, sparking an upheaval of people power. This upheaval has not brought the same degree of change everywhere, but it has brought a dramatic change in the political landscape and a concurrent shift in the security environment in the region. Each country in North Africa has been dealing differently with the issues confronting it. While some governments have collapsed under the weight of public protests and revolution, others have proved durable and even adaptable. Yet, nowhere is political stability assured.



It is within this context of political and social change that transnational threats continue to challenge the security and stability of the region, putting additional pressure on these governments. To explore these developments, and identify the implications for U.S. policy in this part of the world, CNA and McDaniel College co-hosted a day-long conference, which included presentations by U.S. government officials and recognized experts on this part of the world from universities, the media, and prominent research organizations. CNA published a report summarizing the main themes of the conference.

# concepts

## Strategy and Operational Concepts

### U.S. Navy Capstone Strategy Documents and Context (1970-2010)

CNA has a long history of assisting in the development of U.S. Navy capstone strategy, policy, and concept documents. During the 2005-2007 development of A Cooperative Strategy for 21st Century Seapower (CS 21), the Navy asked for a comprehensive analysis of its recent record in creating and implementing these documents.



The Undersecretary of the Navy extended this effort through

2010, to assist in the development of not only CS 21, but also the Naval Operations Concept, Naval Doctrine Publication 1, and a series of Navy Strategic Plans. CNA circulated numerous interim briefings, reports, and extracts throughout the study period. The final 17-volume report represents the results of CNA's analysis and covers not only the documents themselves, but also the political, economic, and military context within which they were formulated, organized by decade since 1970.

### The Big Picture: What is the Best Strategy?

Discussions on the best grand strategy for the United States have taken on renewed salience in recent years in light of the rapidly changing strategic environment. This study for the Chief of Naval Operations' Strategic and Planning Division seeks to lay out the primary contending grand strategies in the contemporary debate, and relates them to the perspectives of the Department of Defense and the U.S. Navy.



## Excerpt from “Grand Strategy: Contending Contemporary Analyst Views and Implications for the U.S. Navy”

“A grand strategy, properly formulated and implemented, can lend a coherence and logic to a nation’s otherwise ad hoc and reactive foreign policies. Especially in the context of scarce resources and capabilities, grand strategies can lead to a more efficient use of a state’s assets. In light of the fiscal challenges the United States will face in the coming decades, this attraction will be especially powerful. Moreover, a grand strategy can help coordinate large and diverse bureaucracies, as well as communicate a government’s policy objectives and plans both to its own citizens and to other states, including both allies and adversaries.

“Some, however, question the utility or propriety of a grand strategy, especially for the United States; they view such a strategy as a distraction, as undemocratic, or as un-American. Others are skeptical of the ability of the United States to formulate and carry out a coherent grand strategy. They argue that, given the range of U.S. interests around the world and the number of domestic actors that exert considerable influence on foreign policy, the United States cannot make the tough choices that a real grand strategy requires.

“Despite these disagreements, debate continues about an appropriate grand strategy for the United States, suggesting that the adoption and implementation of a grand strategy is desirable for at least a significant segment of government policy-makers and influential outside analysts. In light of this, understanding the debate is important.”

## Scanning the Horizon: Implications for Navy Strategy

This study was part of a broader effort to provide analytic support to the Chief of Naval Operations’ Strategy and Policy Division to “refresh” the basic maritime strategy document, “A Cooperative Strategy for 21st Century Seapower.”



CNA reviewed and assessed strategies, concepts, doctrines, policies, and trends in strategic thinking, as reflected in documents published by national and joint authorities, as well as the U.S. Army, Air Force, Coast Guard and Marine Corps. The study described the implications of national and joint strategic concepts for Navy strategy. It then provided detailed recommendations to the Navy on each of the other services’ strategic initiatives and suggestions for Navy interactions in Warfighter Talks with the other services’ headquarters staffs.

### The Marine Corps Returns to the Sea

For the past decade, the Marines have been conducting land warfare in Iraq and Afghanistan. Now, the U.S. Marine Corps is returning to sea-based operations and must update its

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amphibious—i.e., sea-to-land—warfare capabilities for the 21st century. To help it do so, the Commandant has established a permanent task force called the Ellis Group. CNA is central to the effort of this new group, assisting with seminars, wargaming, and analyses. The first CNA-Ellis Group seminar, held at CNA headquarters in August, brought together more than 100 Marine Corps and Navy officers and civilians. Topics included future operations in the littoral; the relationship between the Navy and Marine Corps; and the potential concept of the “Single Naval Battle,” in which all elements of the maritime battle—sea, land, and air—are seamlessly integrated.

### Can the Navy Help Make Piracy Fail?

Somalia-based piracy, a constant low-level threat for decades, rapidly increased from tens to hundreds of incidents per year between 2005 and 2010. At the same time, pirate operations moved from near-shore, small-boat-based attacks to the use of large “mother ships” taking prizes throughout the Northwest Indian Ocean. During this period, the Somalia piracy “business model” remained fundamentally unchanged: financiers operating from ungoverned coastal villages funded and equipped small pirate groups who boarded and diverted target ships to coastal holding areas, and pirate liaisons negotiated with ship owners to ransom cargo and crew.

While U.S. Naval Forces Central Command conducts sea-based counter-piracy operations, U.S. Naval Forces Europe-Africa (NAVEUR-NAVAF) works with NATO, European Union (EU) partners, as well as commercial interests, to coordinate effective approaches to reduce Somalia-based piracy.

NAVEUR-NAVAF asked CNA to provide a better understanding of how to best help these stakeholders. CNA proposed to analyze what makes East African piracy work as a successful “business enterprise” and identify how NAVEUR-NAVAF can help make this business fail.

CNA analyzed how pirates recruit, operate, and profit from pirate activities. Through this analysis, CNA research analysts identified who in the military, commercial, inter-agency, or international communities would best be able to disrupt identified vulnerabilities in the pirate enterprise.



NAVEUR-NAVAF also asked CNA to use its “business model” framework to assess specific proposed NATO, EU, and current U.S. counter-piracy options. By articulating how the options affected the pirate enterprise, from recruitment to pay-off, analysts were able to identify the risks and benefits of each option, whether land or sea-based, as well as identify metrics that should reflect the progress for each option. Recent counter-piracy developments have tested this work, and CNA saw that the assessments correctly predicted observed operational effects of international actions.



# gaming

## Wargaming, Experimentation, and Data

### Wargame: Operational Wraparound

The U.S. Army Training and Doctrine Command (TRADOC) Analysis Center's (TRAC) Irregular Warfare Tactical Wargame (IW TWG) replicates ongoing and future irregular warfare operations (unconventional warfare, foreign internal defense/security force assistance, counterinsurgency, and stability operations) in



order to analyze the effect of changes in materiel, organization, and tactics, techniques, and procedures. In particular, the game is capable of showing the effects of operations on the host nation population (across a wide range of metrics) and the effects that the host nation population has on the executed operations. The IW TWG focuses on battalion operations; units are modeled to the team level.

TRAC asked CNA to create a board game that allows the wargame players to understand, and be affected by, the brigade and higher environment in which they are operating. CNA developed the Operational Wraparound (OWA), a board game for four players

encompassing a brigade area of operations; higher-level echelon effects are represented implicitly. It is played by a notional brigade commander, threat commander, host nation government official, and U.S. government official. At the most basic level, the OWA 1) informs battalion-and-below IW TWG players about their immediate operational surroundings, and 2) models command interactions in an irregular warfare setting. These interactions include effects of infrastructure and essential services improvements (and damage/degradation), popular support initiatives, local and regional politics, national events, and combat. This project has had the added benefit of increasing collaboration between CNA and the Army. Currently, TRAC has a CNA analyst at their headquarters in support of this project and other command priorities.

### Better Decision-Making Through Wargaming

There was growing interest in CNA wargaming support this year. Besides the support to the U.S. Army's Training and Doctrine Command described above, CNA designed a theater-level irregular warfare (IW) tabletop wargame for the Office of the Secretary of Defense, Office of Cost Assessment and Program Evaluation. Analysts also helped the Marines' Operations Analysis Division develop an analytic baseline for IW by hosting a seminar wargame for two dozen experts on Sudan.

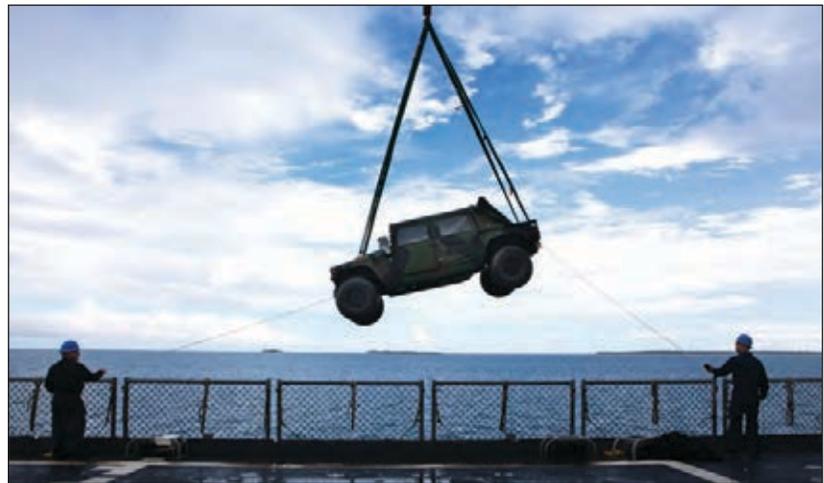
CNA's wargaming portfolio grew to include helping the Marine Corps examine the state of the art of wargaming, and to assess the possible risks and benefits of developing a multi-player online gaming system

as compared to a single-player immersive one. CNA researchers also designed and conducted a challenging tabletop wargame that cast players in the roles of major stakeholders in order to explore the critical decisions that the Department of Defense will face about which programs to initiate, sustain, or cut, and the strategic risks of these choices.

## Building the Marine Corps of Tomorrow Through Experimentation

CNA has four analysts assigned full time to the Marine Corps Warfighting Laboratory (MCWL). The researchers help design experiments; plan for measurement and data collection; observe experiments and assist in data collection; and describe, document, and analyze experiments.

This year, in addition to the experiment support, the CNA analysts have begun supporting MCWL with a series of analytical studies. These include helping examine ship-to-shore logistics support and seeing what future gaming capabilities might be pursued. Researchers also supported MCWL's ongoing study on how well a Marine Expeditionary Unit can sustain dispersed companies ashore. To do this, CNA developed an analytical model that enables users to vary the number of units ashore, their size, their geographic distribution, and their sustainment rates. This tool can be used to see how many aircraft/landing craft sorties will be required to resupply units from various distances.



## Historical Fleet Employment Database Project

For more than a decade, this project has provided crucial support to the Office of the Chief of Naval Operations (OPNAV) and other staffs across the Navy. It continues to do so in three ways. First, it helps answer high-profile and urgent requests for information. Such requests usually involve strategic or Navy-wide issues, and recent ones have focused on questions such as, “Has the Navy provoked certain countries with deployments to their regions?” “How many ships and submarines did the Navy deploy in a particular year?” and “What was the Navy’s presence in the Indian Ocean over the past two years?”

This project also collects, manages, and archives a variety of critical classified and unclassified data that are not kept by the Navy or any other organization. Such information involves, among other things, fleet structure, platform employment, and crisis responses. Finally, this project manages and creates a variety of databases and provides them to OPNAV and others. For example, the Integrated Ship Database is a publicly available database that is updated each quarter with fleet and ship information from multiple sources. In total, these efforts have made CNA a clearinghouse of Navy-related data and information that is of increasing usefulness to OPNAV and others.

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# energy

## Energy and the Environment

### The “Strait” Truth on the Flow of Oil

The free flow of oil is critical to world commerce and global economic prosperity. Oil trade requires the use of maritime trade routes, which can span hundreds to thousands of miles. Hence, oil tankers often



travel through straits and canals to reduce transport costs. These passage-ways—referred to as chokepoints—are narrow channels along the most widely used global sea routes.

This study, “The Economic Implications of Disruptions to Maritime Oil Chokepoints,” evaluates how potential disruptions at critical chokepoints could affect the U.S. economy and economies around the world. While CNA’s methods could be used to understand the importance of any chokepoint, CNA analysts focus on the

Strait of Hormuz, the Strait of Malacca, the Suez Canal, the Bab el-Mandeb Strait, the Turkish Straits, and the Panama Canal. At any of these chokepoints, the world’s oil supply is at risk of disruption, and the oil transported through these chokepoints has great value. As many as 17 million barrels per day flow through the Strait of Hormuz alone. Additionally, chokepoints tend to be in proximity to poor countries, which often lack institutions that can enable or provide maritime security.



## Excerpt from “The Economic Implications of Disruptions to Maritime Oil Chokepoints”

“Our chief finding is that only a few of the world’s industrialized countries would be unable to avoid a sudden, steep recession if a major oil disruption to the Strait of Hormuz occurs, assuming that the few countries with large strategic oil resources do not share them with the rest of the world. For instance, if a 100 percent disruption to the Strait of Hormuz were unmitigated for 90 days, of the 35 countries we examined, three would see their unemployment rate increase by 1 percentage point by the end of the next quarter. If a similar disruption occurred to the Strait of Malacca, one country—Singapore—would suffer this large increase in unemployment. No country would suffer a similar negative economic shock if an unmitigated, complete disruption occurred at any of the other major chokepoints.”



## Estimating the Effects of Climate Change on Installation Energy Use

The U.S. Global Change Research Program stated in 2009 that climate change impacts are already being observed across the United States, and ecosystems and society must adapt to the ongoing changes. As a result, Executive Order 13514 of Oct. 5, 2009, directed the formation of the Interagency Climate Change Adaptation Task Force. The task force recently recommended that the federal government expand and strengthen the nation’s capacity to prepare for climate change. The task force further recommended that federal agencies make adaptation a standard part of agency planning. The Department of Defense, a task force member, is now beginning to develop policies to ensure that climate change is properly accounted for in the department’s infrastructure planning process.



CNA looked at an obvious but seldom discussed implication of climate change for installation managers: rising temperatures and their implications for installation energy demand. Analysts concluded that climate change has the potential to significantly affect energy demand on military installations. Installation planners need to account for this—not only for the potential increase in energy costs, but also for its implications for building design and heating and cooling systems.

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# education

## Education and Training

### Measuring and Improving Teacher Effectiveness

Teachers and other education leaders are at the center of the continuing national debate about how to improve schools and help students succeed. Theories and approaches regarding the best ways to prepare teachers and evaluate effectiveness—and how they relate to student success—are more numerous than they are proven. CNA continues to conduct studies that explore various facets of these issues. Some highlights:

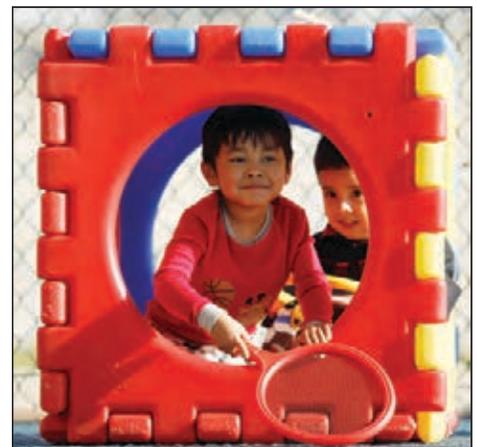
- **Using Data to Inform Decisions:** CNA is conducting a randomized, controlled trial study to evaluate a program aimed at helping teachers enhance their ability to use data in elementary school mathematics instruction. This work is being carried out under a four-year \$3 million grant from the Institute of Education Sciences.
- **Understanding Teacher Certification:** CNA is leading a multi-year examination of the impact of certification from the National Board for Professional Teaching Standards on teaching and student outcomes. The current study is using teacher and student-level data from Chicago Public Schools and the state of Kentucky.



### Enriching Outcomes for Low-Income Children

The Centers for Disease Control and Prevention (CDC) sponsored a pair of randomized, controlled studies in Miami and Los Angeles to examine the effects of the Legacy for Children™ intervention on child development outcomes. Legacy for Children™ provides parenting training in low-income communities. About 600 families participated in the study, with two-thirds receiving the intervention and one-third serving as comparison cases.

CNA is also executing the multi-year Legacy for Children™ Longitudinal Follow-Up Study, also funded by the CDC. This follow-up study will answer two questions: what is the long-term effect of the Legacy™ intervention on child development outcomes?; and how do certain demographic or maternal/family-functioning factors (e.g., parenting practices) mediate or moderate the effects of the Legacy™ intervention?



CNA is in the process of locating and collecting data on families from the original studies as their children enter their fourth year in school (third grade for most). Extensive data are collected during visits to the family home, in visits by the family to the study's clinic, and through quarterly telephone interviews. The data from the assessments give professionals the information needed to answer the above-mentioned questions.

## Finding Innovative Ways to Offer Challenging Courses



In many schools in rural northeast Tennessee, access to rigorous classes and college planning guidance is limited. CNA's Education Division is working with the Niswonger Foundation and a consortium of schools in the region (known as NETCO schools) that received a federal Investing in Innovation (i3) validation grant to change this. During the first year of the i3 grant, CNA visits to NETCO schools, interviews with educators, and analysis of related data have pointed to progress and recommendations for improvement. For example, analysts found that funds used for online courses led to more than 800 students enrolling in these courses in summer 2012—

more than twice as many as the previous year. CNA's interviews gleaned information that influenced funding decisions: school counselors in every district revealed that they wanted their students to have more time with the supplemental career and college counselors provided under the grant. Based on this information, funds were reallocated to add two more counselors in 2012-13. CNA will continue to research and analyze implementation progress over the course of the four-year grant, as well as conduct a summative evaluation of overall results.

## Reducing Students' Nonproductive Waiting Time



The Navy wants to improve efficiencies in its Manpower, Personnel, Training, and Education supply chain. One area of focus is the interface between A-school (basic skills training) and C-school (advanced training). The Navy uses a "push-pull" supply-chain strategy: it "pushes" personnel through training until they complete A-school, and then students wait to be "pulled" into a C-school in response to demand from the Fleet. There needs to be a minimal level of inventory to keep the system working properly—that is, the system needs for some number of students to be awaiting transfer to C-school. But, as it is, large

numbers of students tend to accumulate, waiting for orders or waiting for a class to start. What is a desirable number of students to be awaiting orders or awaiting instruction?

By using simulation, CNA was able to determine what minimal numbers should be awaiting orders and awaiting instruction in order to achieve a steady supply of some ratings (i.e., occupations) in the Advanced Electronics Computer Field. However, some of the other ratings could not achieve a steady state with the current course schedules. This suggests that those ratings need to reconstruct their course schedules or change their policies to create a more stable supply chain.

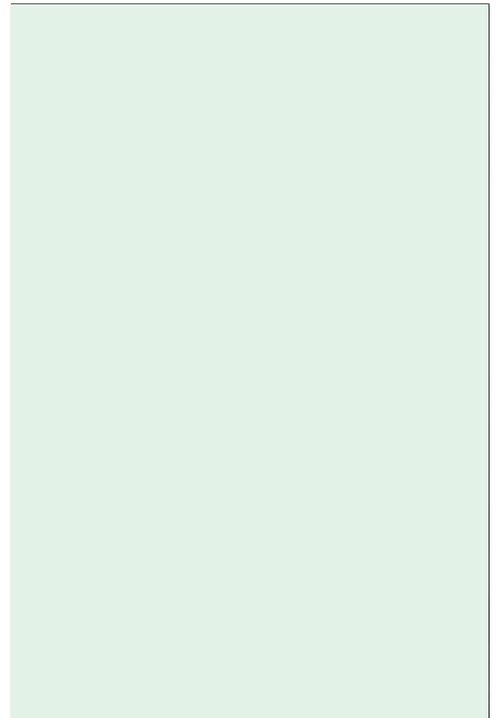
## Helping the Marine Corps Adapt to the “Post-Afghanistan World”

In Afghanistan the U.S. Marine Corps is organized into MAGTFs (Marine Air-Ground Task Forces), made up of units from command, air, ground, and logistics sections that act under a single commander. Now that the operation in Afghanistan is drawing down, CNA is helping the Marine Corps Training and Education Command develop a MAGTF training program to adapt to the “post-Afghanistan world.”

CNA research analysts addressed four areas: adaptability, organization, assessments, and prerequisite training. For adaptability, CNA analyzed how the Marine Corps’ Combined Arms Exercises evolved over time to support changing requirements in Iraq and Afghanistan, and what program elements are needed to ensure that the proposed Integrated Training Exercise can respond agilely to future changes. In the area of organization, researchers looked at how roles and responsibilities will change as different commands and programs are combined. The assessment analysis asked, “How should a training event be used—as a test, with a performance standard, or as an opportunity to improve performance?” The related prerequisite analysis is determining what unit proficiency is needed in order to take full advantage of training opportunities and how units can achieve it.

The command used CNA’s results to support the development of its new training program. The work with the command and the trainers is continuing.

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# cyber

## Cyber Concerns

### Science and Technology for Communication and Persuasion Abroad

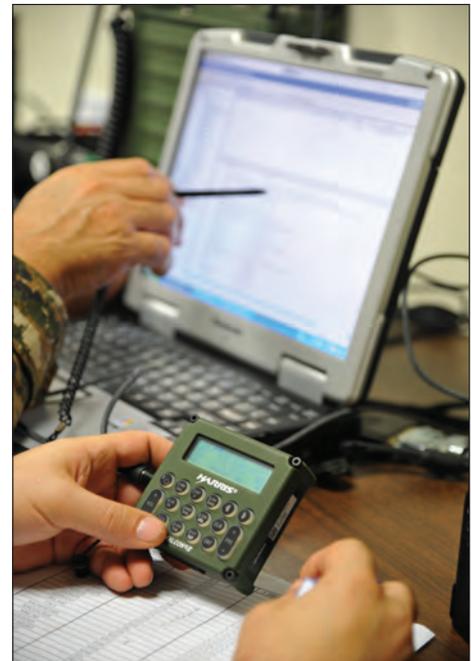
As communication becomes more digital (i.e., mediated by computers), more interactive (enhancing an individual's influence), and more mobile, those who understand the communication environment and know how to use it effectively will have more influence than those who do not. To that end, CNA helped the Department of Defense Rapid Reaction Technology Office (RRTO) update its 2009 Strategic Communication Science and Technology Plan. The new report finds that there has not been adequate investment in the technological gaps identified in 2009. Furthermore, the U.S. government has made limited R&D investments in using social interaction technology, persuasive technology, and immersive virtual environments and simulation games for communication and persuasion—areas of R&D not discussed at length in RRTO's 2009 report. Based on its analysis of these gaps, CNA has identified several areas for investment, particularly in the digital realm.



CNA emphasized, however, that despite the focus of its report on technology for communication and persuasion, such technology will only succeed in advancing U.S. interests if it serves well-informed policies; if the decision-makers use and understand the technology themselves; and if the practitioners carrying out those policies remember that putting a human face on an institution's words and actions and establishing positive relationships—on- and off-line—with people working toward shared goals matter more than the substance of any particular message.

### Cyberterrorism

For the U.S. armed forces, cyberspace—defined by the Department of Defense as “a global domain within the information environment”—is more than just a medium for communication. It is increasingly understood as a realm for war-fighting. In this report, CNA experts discuss the definition of cyberterrorism, present some hypotheses to help explain why terrorists have paid relatively little attention to the use of cyberspace as a medium for conducting attacks, and conclude by exploring how this might change and what might be done to anticipate it.



## Excerpt from “Cyberspace and Violent Non-State Groups: Uses, Capabilities, and Threats”

“Regardless of whether cheaper, less complex cyberweapons become more attractive to terrorist groups, the bottom line is that death and physical destruction via cyberspace are likely to remain very remote possibilities. However, it would be a mistake to ignore developments in the terrorist use of the Internet. If we are correct that the cyberterrorists of the future may seek to sow popular fear through public shaming, such a tactic could pose a very considerable threat, perhaps even to U.S. military operations. For example, as part of a broader campaign to undermine a U.S. intervention abroad, terrorists might expose the email accounts and financial records of the families of units deployed in a war zone. As the Wikileaks case demonstrates, the revelation of sensitive information before a global audience can have serious security consequences for the U.S. government.”

## Cyber Mission Assurance

For the past nine years, the Director of Operational Test and Evaluation of the Department of Defense has had a congressional mandate to assess the interoperability and information assurance of computer systems during major exercises for each of the armed services and combatant commanders. In 2011, CNA began supporting this effort by providing analysis of these systems’ “mission assurance” in the exercises.

Interoperability describes the degree to which different systems at different locations can successfully exchange data with each other. Information assurance assesses the systems’ reliability and security.

Mission assurance provides the connection between these performance characteristics and the operational impact of their shortfalls. In these exercises, CNA analysts monitor operations and decision-making at

key command nodes, and determine how degradation of interoperability or security affects the larger missions. These degradations may be self-inflicted, due to inherent problems with the systems under study, or caused by a cyber adversary, simulated in the exercises.



In the past year CNA has supported Navy, Marine Corps, and Air Force exercises in this mission assurance role, and has begun describing common trends. CNA analysts have documented issues resulting in degradation of the timeliness, accuracy, and efficiency of some common networks and computer applications when used against a simulated cyber-savvy adversary. Researchers observed impacts to missions including delays in or incomplete situational awareness provided to commanders, reductions in available forces as a result of denial of access to information, and occasional inefficient reallocation of personnel to overcome these challenges. In each of these cases, analysts have attempted to uncover the root interoperability or information assurance issues responsible, and have suggested workarounds or mitigation procedures. This work has also highlighted some best practices for cyber warfare, including the development of alternative communications plans to help overcome some of these challenges.

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## Testing a New Computer Security System

In response to WikiLeaks and the overall increase in the cyber threat to military networks, a new security system was put into place sooner than planned. The Host Based Security System (HBSS), which is to be used on all Department of Defense computers, is designed to monitor, detect, and counter attacks against computer networks and systems.

CNA was asked to send analysts to sea to assess the new system's performance and help operators use the information it provides. The analysts uncovered problems in the real-world operational environment that had not been detected by the HBSS vendor in the more sterile laboratory and developmental test environments. They traced the problems to inadequate training and possible flaws in the software. Their results compelled the Defense Information Systems Agency and the HBSS vendor to undertake a formal review of HBSS stability in the shipboard environment. The analysts also helped the Navy develop HBSS dashboard displays so that operators can monitor networks and take corrective action when needed. CNA has been asked to continue this work in the new fiscal year.



## Using New Technology to Increase Ships' Bandwidth

CNA worked with the Space and Naval Warfare Systems Command (SPAWAR) on optimizing data throughput to the afloat user by testing a new wide-area network optimization device as part of the system that manages bandwidth to and from a ship. Analysts tested the advanced data compression of the new device on USS Nimitz, and found that it could increase the ship's effective bandwidth substantially. If the Navy could get more data throughput over given satellite bandwidth, it could either reallocate existing bandwidth to disadvantaged ships or save money by reducing commercially leased resources.



# buy, build,

## Acquisition, Infrastructure, and Readiness

### Towing, Salvage, and Rescue Ship Replacement

The U.S. Navy currently has four fleet ocean tugs (T-ATFs) and four rescue and salvage ships (T-ARSSs) operated by the Military Sealift Command. These ships are nearing the end of their nominal service lives, and the Navy intends to retire them beginning in about 2020. The Director of the Navy's Strategic Sealift and Combat Logistics Division asked CNA to perform an analysis of alternatives (AoA) to support the replacement of that towing and salvage force. Researchers identified the primary capabilities required in such ships and estimated the number and geographic distribution of ships needed to meet both peacetime and wartime demands. The analysis suggested that all the ships should have the same basic rescue and salvage capabilities. It further suggested that, although all of the ships should have towing capability, not all would need to have sufficient power to tow the very largest Navy vessels. The study also found that there is a commercial market for ships meeting most, if not all, of the Navy's requirements. So, various leasing arrangements or direct purchase from commercial vendors is an option the Navy should consider in addition to the specific concept designs developed by NAVSEA for the AoA. CNA briefed senior Navy acquisition executives, who are using the results to help identify the tradeoffs needed to make the replacement program affordable.



### The Navy's Laydown and Dispersal Process

Periodically the Navy reviews ship homeport decisions with an eye toward operational requirements, maintenance and ship repair stability, dispersal of key assets, and national strategic guidance, among other criteria. Following a study by the Government Accountability Office that emphasized transparency, repeatability and defensibility of basing decisions among the services, the Chief of Naval Operations' Strategic and Planning Division asked CNA for help in understanding how to make its current strategic laydown and dispersal process more transparent and analytically defensible to outside organizations. CNA identified the current processes used to support strategic laydown and dispersal decisions, looked at how the other services manage their strategic laydown decisions to identify potential best practices for the Navy, identified elements that prevent or inhibit transparency, and developed a revised process that would change the order of key steps as well as standardize the actions taken during each step.

# prepare

## Can the Navy Shrink Its Shore Footprint?

CNA has been studying whether the Navy can reduce its footprint—that is, the size of its infrastructure—on shore. The study team examined the current installation requirements process and recommended improvements to link installation requirements more closely to the number of units and people assigned to an installation.

The team also examined trends in the size of the infrastructure: the absolute size has trended down, but the replacement value is increasing at about two percent per year. The study team then identified the functional areas that have grown the fastest. Finally, the team developed estimates of functional areas that appear to have more capacity than required. Airfield operations, base support, and family support buildings are among the functions with more capacity than required. The team's findings will give the Navy some direction on where it can consolidate facilities to reduce its shore footprint.

## Future of Biometrics

CNA is helping the U.S. Army reorganize its executive management (EM) of Department of Defense biometrics and forensics to improve both cost and operational efficiency. Although this EM for biometrics is an Army element, it is performing critical functions for all of the services and combatant commanders.

Among other things, CNA was asked to provide courses of action that would provide efficiencies in terms of personnel and synergy with the field of forensics. CNA produced several viable courses of action, which analysts narrowed down to two (including a recommended one). The analysts briefed the findings to the Provost Marshal General, who is responsible for all facets of law enforcement in the Army.



## Modeling Ship Expected Service Life

With the prospect of future budget reductions, the Navy will have to make tradeoffs between procuring new ships and maintaining current ships to achieve the best possible force structure with a limited budget.

CNA has developed a model that examines how deferring ship maintenance affects expected service life. The model mathematically represents a few fundamental notions about what determines when



a ship should be retired. Obsolescence and modernization, material condition, and the cost of operating the ship are the building blocks of the model. It also incorporates the effects of deferring ship depot maintenance, which causes material condition to decline and leads to a consequent drop in the ship's military value. Including these effects allows CNA to incorporate the idea that deferred maintenance leads to increased failures, reduced structural integrity, and inhibited operational capability. The model uses a decision rule that a ship should be retired when its cost and value are lower than the cost and value of the replacement ship and incorporates a cost for deferring maintenance, which increases the cost of accomplishing the maintenance at a later date. CNA used the model to project how much of a ship's expected service life is lost when maintenance is deferred. The model suggests that modernizing and maintaining ships results in a larger fleet with ships in better condition and causes only a slight decrease in the number of ship acquisitions.

### Effects of New Aircraft Type-Model-Series on Operation and Maintenance Costs

New aircraft type-model-series (TMS), such as the MH-60R and MV-22B, have recently entered service, and the F-35 and P-8 will soon be introduced. The Navy asked CNA to examine how these new TMSs will affect operation and maintenance (O&M) costs.

CNA analysts looked at historical data, examining the O&M cost outcomes of past TMS introductions. Researchers used Navy, Air Force, and Army aviation maintenance databases to construct a key "newness" measure for each TMS. With this measure, analysts found ways to better predict which aircraft will cost more to



support and which will have less cost growth over their lifetimes. CNA analysts also found a strong relationship between an acquisition program's investment in integrated logistics support and savings in O&M. The CNA team recommended that the Navy incorporate "newness" factors during design and development to inform life-cycle cost tradeoffs, and account for the increases in O&M cost that are likely to result from cuts to acquisition programs' investments in integrated logistics support.

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# people

## Manpower and Personnel

### The Fitness Report System for Marine Officers

The Marine Corps Fitness Report (FitRep) system provides the official evaluation and record of an officer's performance. Given the FitRep's importance in determining fair and equal opportunity for career progression and continuation, it is crucial that the system be reviewed periodically. The Marine Corps implemented the current FitRep system in 1999 to address concerns about grade inflation, and the system has not received a thorough examination since then.

The Director, Manpower Management Division, asked CNA to conduct a systematic review of the FitRep system for officers and to examine whether the system is accomplishing what the Marine Corps intended. This is a broad question that encompasses several issues. Previous studies have focused on two issues: how do FitRep scores differ by observable characteristics?; and how do FitRep scores affect promotion and continuation?



CNA identified whether the Fitness Report system was keeping grade inflation in check; ensuring fairness to all officers; and identifying the best most-qualified Marines for promotion, career designation, and command and resident school boards.

### Characterizing the Economic Prospects of Veterans

The unemployment rate, an oft-cited labor market statistic, is reported by the Bureau of Labor Statistics for veterans and non-veterans. The popular press, including The Wall Street Journal and The New York Times, often compares the veteran unemployment rate with the overall national unemployment rate as a way to characterize the civilian economic prospects of veterans. CNA analysts, however, argue that the veteran and non-veteran unemployment rates are not really comparable metrics. Analysts suggest that, rather than using unemployment rates to measure the ability



of those who leave military service to get a job, measure, instead, how long it takes jobless veterans versus non-veterans to find employment. This comparison addresses the following policy question: relative to a jobless non-veteran, how hard is it for a jobless veteran to find a civilian job?

## Recruiting Non-Citizens

Although in recent years non-citizens have made up only about 4 percent of enlisted accessions, they are a potentially valuable pool for enlisted recruiting for three reasons. First, the number of U.S. non-citizens who are eligible for enlisted military service is large: approximately 1.2 million non-citizens are in the desired age range and have the requisite education, resident status, and English language ability for enlistment. Second, a sizable share of the recruitable U.S. non-citizen population comes from diverse backgrounds and possesses language and cultural skills that are of strategic interest to the U.S. military. Third, non-citizen recruits are far less likely than citizen recruits to leave the military in the first term, even after controlling for demographic and service-related characteristics that likely affect attrition.



### Excerpt from “Non-Citizens in the Enlisted U.S. Military”

“[E]ducation profiles among non-citizens vary dramatically by region of origin. For example, while only a third of non-citizens from the Americas who are age 18 to 29 and speak English well have more than a high school degree, nearly all non-citizens from India, Pakistan, or China who are age 25 to 29 and speak English well have more than a high school degree. Finally, while Spanish is the most common foreign language spoken in the homes of recruitable non-citizens, other European languages, languages of India, and Asian languages are also frequently spoken at home. This is particularly true among recruitable non-citizens with more than a high school education, who, given their education levels, might be candidates for the officer corps.”

## The Costs and Benefits of Converting to Lump-Sum Selective Reenlistment Bonuses

The Selective Reenlistment Bonus (SRB) program is one of the principal force-shaping tools used by the Navy and plays an essential role in mitigating retention problems in critical military specialties. It is also an expensive program: between 2000 and 2007, the Navy’s expenditures on SRBs exceeded \$150 million per year. CNA analysts looked into the costs and benefits if the Navy were to substitute lump-sum SRBs for its current program of paying out the bonuses annually on the anniversaries of the individual’s reenlistment. The principal argument in favor of this policy change is to capitalize on sailors’ preferences for receiving payment in the here and now: in front-loading payments, the



Navy could offer smaller bonuses without reducing the value that service members place on these bonuses. The principal argument against paying the money out in lump sums is that the prospect of receiving anniversary payments acts as an incentive for sailors to remain in the Navy during their term of reenlistment, and eliminating these annual payments would increase losses from the service. CNA's analysis suggests that adopting lump-sum SRBs would likely result in significant savings over the long term, even accounting for the possibility of

increased losses. These savings would be especially great for smaller bonuses that are offered for shorter reenlistments.

### How Effective is Sea Duty Incentive Pay?

Sea Duty Incentive Pay (SDIP) offers extra monthly compensation to sailors in selected enlisted management communities (EMCs) and paygrades who commit to additional sea duty by extending their sea tours or curtailing their shore tours. CNA recently completed a study to see how effectively SDIP increases voluntary sea time, thereby improving sea manning. The CNA analyst team found that SDIP is effective at increasing sea manning in eligible EMCs and paygrades, and is even more cost effective than previously thought. CNA analysts also found that it is very cost effective compared to other ways of generating additional sea manning, such as increasing sea pay or buying additional shore billets.

This study was timely because the Navy launched several initiatives in fiscal year 2012 to improve fleet manning. As a result of the study, the Navy has increased the budget for SDIP and is expanding SDIP to other EMC/paygrade combinations that are currently undermanned.



## An Analysis of Navy Recruiting Goal Allocation Models

Achieving the desired overall force composition in the Navy requires accessing the right mix of recruits—enlisted and officer, active and reserve. To do this, the Navy must have details about the available recruitable population, including where specific types of people are located. The Commander of Navy Recruiting Command asked CNA to help improve the methods and models which currently allocate recruiting goals geographically. Navy Recruiting Command uses econometric models to guide allocation goals for recruiting enlisted personnel, and employs a less rigorous method for officers. These models consider a variety of factors, but have limitations.

There has not been a review of the enlisted model since the late 1990s, and the current model does not consider all the components of the recruiting market that the Navy may want to examine.



The Navy's method for allocating officer recruiting goals has been developed in less detail, and has not been evaluated recently. Additionally, recruiting goals are tied to Navy Recruiting Districts which are quite large, thus preventing precise allocation of manpower and advertising funds for recruiting purposes. More precise goaling models can facilitate the recruiting command's ability to restructure recruiting in the future.

To access the publicly available research cited in this review, visit [www.cna.org/yir2012](http://www.cna.org/yir2012)

# tactics

## Military Tactics and Weapon Systems

### Adaptive Tomahawk Fires

The Tomahawk Land Attack Missile (TLAM) is often viewed as an “opening-night” campaign weapon, critical for disabling enemy air defenses so that manned aircraft can conduct bombing runs. However, recent operations have also highlighted the potential value of TLAM as a call-for-fires (CFF) weapon. Specifically, TLAM strikes could be used to protect U.S. ground forces in the event that these forces come under hostile fire, particularly in remote locations where traditional close-air support is not available. To realize this potential, however, carefully coordinated tactics and procedures need to be developed so that desired effects can be achieved, while problems such as fratricide or collateral damage are avoided.

In a study for Tactical Training Group Atlantic, CNA examined the current status of call-for-fires tactics development and what would be required to realize an operational TLAM CFF capability. CNA analysts reviewed doctrine; tactics, techniques, and procedures; training and experimentation; proficiency assurance; and current leadership perceptions and permissions relating to CFF employment and outlined a roadmap for making improvements so that TLAM CFF capabilities can be greatly advanced.



### Improving Night Vision

The director of the Navy’s Air Warfare Division asked CNA to assess the limitations of the current



night-vision goggles (NVG) used in naval aviation and provide information for future NVG requirements based upon operational need and the projected development of technology. Analysts reviewed existing lessons learned, the concept of operations for flying in degraded visual conditions, and intelligence assessments. The team conducted extensive interviews with operators in both the Navy and Marine Corps and identified the requirements that NVGs should meet in order to allow pilots to operate outside of the normal visual envelope for unaided flight. Analysts established metrics that allow the Navy to quantify the levels of NVG

performance, assessed the ability of current NVGs to meet these requirements, and identified candidate technologies that would address the shortfalls. Finally, analysts estimated the maturity of the candidate technologies and recommended that the Navy investigate an evolutionary approach to improving the present NVGs in a follow-on cost-benefit analysis.

## How Would Contamination of Marine Corps Aircraft and Ground Units Affect an Operation?

In the aftermath of the earthquake and tsunami that struck Japan in March 2011, CNA conducted a quick-response effort to evaluate the effect of contamination from the Fukushima nuclear reactor on U.S. response operations in support of the Government of Japan. CNA analysts found that radiological contamination of helicopters operating from U.S. ships was persistent and, at high enough levels, could severely impact sea-based operations. The team noted that actual levels of radiological accumulation and persistence on the aircraft, along with times to decontaminate, were significantly higher than doctrinal planning factors. As a result, the Third Marine Expeditionary Force based in Okinawa asked CNA to take a deeper look at the effects that chemical, biological and radiological contamination would have on sea-based operations during combat or other crisis-response operations.



The first part of the study was to understand contamination on ships supporting helicopter lift operations during the Japan response, where the contamination came from, and how it was monitored. Analyzing the detailed survey data from these ships, CNA analysts found that contamination will, indeed, transfer from aircraft to the ship and, without effective contamination controls, will be carried into and accumulate within the ship's interior spaces. This could have immediate operational implications by creating significantly difficult working environments when Marine units are shuttling from contaminated areas on shore back to a sea

base. In the second part of the study, which is currently in progress, analysts will evaluate how contamination will likely affect numbers of aircraft sorties and logistics resupply from the sea base, along with the rate at which ground forces ashore can advance.

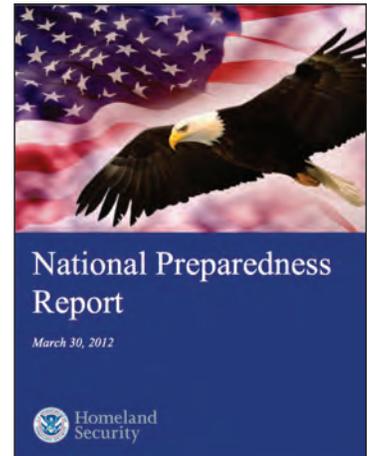
To access the publicly available research cited in this review, visit [www.cna.org/yir2012](http://www.cna.org/yir2012)

# security

## Homeland Security and Justice

### National Preparedness Report

CNA supported the Federal Emergency Management Agency (FEMA) with two major contributions to its national preparedness assessment in 2012. CNA's Comprehensive Assessment System team was instrumental in developing and implementing FEMA's State Preparedness Report (SPR) survey, which collects high-level assessments of states' and territories' preparedness on an annual basis. The SPR results were one of over 800 inputs used by FEMA and CNA to develop the first National Preparedness Report (NPR), released in the spring of 2012. Required by the White House, the NPR evaluates the nation's progress in building and sustaining capabilities to prevent, protect against, mitigate, respond to, and recover from terrorism and natural disasters.



### Postal Exercise Series

CNA supported Training, Exercises and Lessons Learned (TELL) within the U.S. Department of Health and Human Services (HHS) with the design, development, conduct, and evaluation of a full-scale exercise in Minneapolis/St. Paul, Minn., and tabletop exercises in Boston, Mass., Louisville, Ky., Philadelphia, Pa., and San Diego, Calif. The exercises examined, tested, and validated each jurisdiction's Postal Plan, which describes the process for the U.S. Postal Service to deliver prophylaxis to residents in response to a public health emergency.



CNA tailored the exercises to each jurisdiction's needs, working with federal, state, and local planners from agencies such as HHS, the U.S. Postal Service, and the U.S. Postal Inspection Service; as well as with state and local public health departments, law enforcement agencies, and emergency management agencies. CNA developed after-action reports on each jurisdiction's exercise as well as a capstone report that analyzed the strengths and areas for improvement across the five exercises.



This report also established a set of outcome-based National Postal Model assessment factors to inform future postal model planning and exercise efforts in cities across the country.

### Evaluating Critical Law Enforcement Incidents

Through a cooperative agreement with the Community Oriented Policing Services (COPS) Office in the Department of Justice, CNA built on its experience evaluating critical law enforcement incidents in Oakland, Calif., Tampa, Fla., and Baltimore, Md. by establishing a technical assistance program aimed at

helping law enforcement agencies assess and address significant law enforcement-related issues. Under this program, CNA supported the Las Vegas Metropolitan Police Department's (LVMPD) efforts to reduce the number of officer-involved shootings. CNA worked closely with LVMPD to support implementation of some recent reforms in policy, training, and evaluation, as well as to conduct a thorough organizational assessment of the department's policies and practices in regard to these shootings. CNA's report highlighted statistics on officer-involved shootings in LVMPD and assessed activities in several priority issue areas: use-of-force policy; training for LVMPD personnel; the department's Force Investigation Team, Critical Incident Review Team, and Use of Force Review Board; Coroner's Inquest; the District Attorney's Office; and community perspectives. CNA will continue to support LVMPD as it implements the recommendations and will monitor and assess the department's progress.



## Using Agricultural Screening Tools in a Disease Outbreak

The CNA-prepared report, "Recommendations for Establishing Policies and Concepts of Operations for Use of Agricultural Screening Tools in a Disease Outbreak," describes the key findings, issues, and discussion points that arose during an agricultural screening



tools workshop held in Des Moines, Ia. The Department of Homeland Security's National Center for Foreign Animal and Zoonotic Disease Defense hosted the workshop.

### Excerpts from "Recommendations for Establishing Policies and Concepts of Operations for Use of Agricultural Screening Tools in a Disease Outbreak"

"The group quickly ascertained that animal health responders need a way to report and have a shared understanding of the 'phases' of an outbreak. The use of diagnostic assays will vary with different outbreak phases and will be influenced by related factors, such as which commodities are involved, whether animal movement is halted or permitted, and the extent to which the disease has spread.

"Workshop participants also discussed the critical need for an information technology infrastructure to provide communications and links between databases, for reporting laboratory test results. (This same recommendation has risen out of other forums.) Participants noted that the current information technology systems do not support linking the test results that are reported from state and federal laboratories. Agricultural screening tools would present additional results that need to be reported in a timely manner and linked with identification codes for both the animals/premises being tested and the laboratory providing confirmatory results. Thus, a robust information technology infrastructure is also critical for the full, efficient, and effective use of agricultural screening tools."

# health

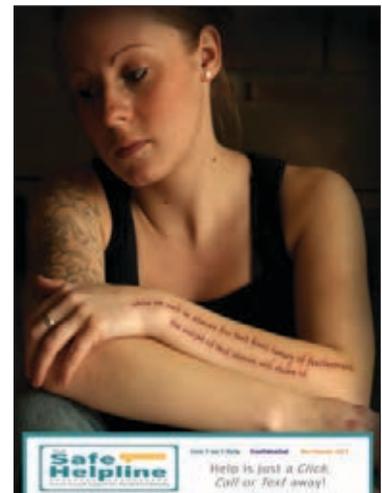
## Strengthening Health Care

### Ensuring the Safety and Well-Being of Long-Term Care Residents and Beneficiaries

Residents and beneficiaries of long-term care (LTC) services can be the victims of abuse and theft perpetrated by those who care for them. What steps would protect these vulnerable populations while still providing an adequate LTC workforce? As part of CNA's project assisting the Centers for Medicare and Medicaid Services (CMS) and the states in their implementation of the National Background Check Program, a team of CNA researchers supported the CMS Long-Term Care Criminal Convictions Work Group, which included representatives from 11 state agencies responsible for regulating LTC services. The CNA team's research and analysis directly guided the work group in developing its recommended options for CMS as to which prospective employees should undergo criminal background checks, what types of convictions should disqualify individuals from employment in the LTC industry, and how long those individuals should be disqualified from employment.

### Helping Sexual Assault Victims through Sexual Forensic Exams

In recent years, the U.S. Navy has made efforts to increase reporting and prosecution of sexual assaults that involve sailors. The use of evidence from a sexual assault forensic examination (SAFE) has helped increase the prosecution of sexual assault cases in civilian settings. To help increase the prosecution of cases within the U.S. Navy, the Navy's Bureau of Medicine and Surgery (BUMED) has trained almost 200 providers to conduct SAFEs. The BUMED Office of Women's Health asked CNA to examine how the evidence from SAFEs is used in the investigation of Navy sexual assault cases, to evaluate the training experiences and needs of Navy SAFE providers, to determine the challenges associated with administration of the SAFEs, and to learn why some victims choose to forego a SAFE even when they seek medical care.



To answer these questions, CNA conducted 45 interviews with Naval Criminal Investigative Service (NCIS) agents, SAFE providers, and, as a proxy for victims, Sexual Assault Response Coordinators (SARCS) who have contact with the victims, rather than interviewing victims directly given the sensitive nature of the issues. Based on the analyses of the interviews, NCIS agents expressed that SAFEs were an important part of the investigation and noted that evidence collected could be used to corroborate a victim's and/or alleged offender's account of the incident. Agents also felt that communication with SAFE providers was important. However, some SAFE providers mentioned that they preferred to be an objective collector of evidence and reported minimal communication with NCIS agents. The providers indicated that one of the strengths of their training was learning how to properly document evidence collected during the exam; yet some also noted that they needed more "hands-on" practice and opportunities to participate in mock trials.

Challenges identified by providers included: 1) not having clear, up-to-date instructions in the SAFE kit, 2) not having necessary equipment and supplies to properly conduct the exam, and 3) concerns about protecting the patient's privacy (e.g., conducting SAFEs in a private setting). Interviewees reported that reasons victims do not get a SAFE include not wanting an investigation of the sexual assault (e.g., they want a restricted case), not wanting their command to know about the assault, concerns about the negative impact the assault may have on their career, and/or concerns that the exam may be too painful.

# aviation

## Support to the Federal Aviation Administration

### Modeling Air Traffic Delays for the FAA

The Office of Performance Analysis (OPA) in the Federal Aviation Administration's Air Traffic Organization uses operational data to determine the key drivers of delay in the interconnected system of airports, airways, and equipment referred to as the National Airspace System. In support of this office, CNA develops, enhances, and validates modeling tools to simulate and analyze airport and airspace capacities and overall National Airspace System delay performance. CNA led an effort to develop a model to help OPA understand why aircraft crowding occurs at gates. Besides the analytical framework for incorporating gate congestion into the OPA simulation models, CNA identified the sources of information that populated the model. For the airports CNA analyzed, OPA now can predict, with a high degree of accuracy, the delay that can be expected due to gate congestion.



### Modernizing the FAA's Aeronautical Information Management Program

CNA has shaped and implemented new technologies to help the Federal Aviation Administration's Aeronautical Information Management in its modernization program. The CNA team was instrumental in developing a risk-management plan for the FAA to support a segment of the program. The team also implemented a powerful risk-monitoring tool that uses SharePoint technology to track risk, and provided a way for FAA managers to stay current on the uncertainties facing the program. Although the SharePoint technology had been available as an FAA resource, it had not previously been used in this fashion. The CNA team shaped this technology into a highly effective instrument for risk management and strategic planning. The FAA's new Program Management Office staff can now access key information on uncertainties in the program and develop mitigation strategies before problems arise.



## Where Can the Navy Exercise With Little Effect on Civilian Flights?

In some upcoming exercises, the U.S. Navy will be testing new ship interrogation equipment that can interfere with civilian aircraft transponders—the devices on airplanes that relate altitude and identity information to air traffic controllers. The Navy has been working closely with the FAA's Spectrum Engineering Office and CNA to identify areas in the Atlantic, Pacific, and Gulf of Mexico where exercises can take place with minimal impact on civilian flights. The FAA asked CNA to use historical flight data to find the dates, times, and locations where the fewest airplanes fly. CNA created numerous “hot spot” charts of the entire U.S. oceanic airspace, which identified the best possible locations for Naval exercises based upon the lowest number of civilian aircraft during each hour of the day.



To access the publicly available research cited in this review, visit [www.cna.org/yir2012](http://www.cna.org/yir2012)

# awards

## CNA Awards Day and Trustees Award

### 2011 Phil E. DePoy Award for Analytical Excellence

Every year CNA holds its Awards Day event, where it announces winners of the major CNA awards and recognizes numerous others for their deployments, military service, and volunteerism.

For the Phil E. DePoy Award for Analytical Excellence for 2011, CNA honored two analysts, Brent Boning, and Jason Thomas.

Boning helps his sponsors' decision-making with state-of-the-art statistics and modeling to help them understand the impact of their programs and of changes in their processes. He has led groundbreaking studies that measure performance. Several of his projects that measured shipyard productivity were used to improve management and funding of shipyards.

Boning also led a study that examined the use of procurement auctions in the Department of Defense. He found that open-bid auctions resulted in prices about 4.5-percent lower than sealed-bid auctions, which are similar to the conventional government purchasing practice.

Thomas also received the DePoy Award for 2011. A key achievement of his work as the overall program manager for the Safety and Security Comprehensive Assessment System (CAS) team has been the complete overhaul of FEMA's State Preparedness Report (SPR) Survey tool.



In 2011, the CAS team, led by Thomas, developed an assessment methodology that aligns with constantly changing national preparedness policy requirements. Upon release of new FEMA guidance on identifying and assessing threats and hazards, and at the client's request, Thomas embedded directly with a high-level "tiger team." As part of that group, he quickly discerned how to update the SPR approach while maintaining overall data integrity. The reason for the success of the CAS program to date, as outlined in clients' testimonials, is Thomas's leadership and vision and his clients' trust in his analytical and problem-solving skills.

## 2011 Mary Ann Pianka Award for Exceptional Service

The 2011 winner of the Mary Ann Pianka Award for Exceptional Service was Maria (Theresa) Kimble.

Kimble, a senior software engineer for CNA's Advanced Technology and Systems Analysis (ATSA) Division, provides database and programming support for projects in both ATSA and CNA's Resource Analysis Division (RAD). She embodies a unique blend of analytical, technical programming, and client relations skills.

Within RAD, she is the lifeblood of CNA's longitudinal manpower databases. She is expert in database construction, management, and use, and is adept at constructing tools that extract data from large databases and converting these data into useful information.

In addition to her analytical and programming skills, Kimble is skilled in client relations. For example, she is widely recognized and respected by the Marine Corps' Manpower and Reserve Affairs (M&RA) staff as an expert in programming and working with Marine Corps manpower data.



## 2011 Board of Trustees Award

The CNA Board of Trustees made Alison Basse the first recipient of the annual Trustees Award. Basse has worked at CNA for 22 years. She is the principal advisor to the President of the Center for Naval Analyses, Paul Speer, on financial analysis and contractual management issues. She directly represents the Center on financial and contractual matters with parties outside CNA, including the Office of Naval Research Contracting Officer and N81 Contracting Officer's Technical Representative. Basse also works with key individuals throughout the organization and leads complex projects that require a thorough knowledge of the company, current policy, procedures, and long- and short-term financial strategies and objectives.



Basse tracks all core and above-core activities and their funding at the FFRDC level, checks and resolves discrepancies with the individual divisions, and provides biweekly funding projections that allow the FFRDC leadership to make informed decisions.

# news

## CNA in the News

ANALYSIS & SOLUTIONS

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Reporters, writers, and broadcasters from around the world turn to CNA research analysts for explanations and insights on issues of the day. These logos represent a sampling of the news organizations that have interviewed CNA analysts over the last three years.

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