In 2013, CNA Corporation continued its tradition of providing actionable analysis and workable solutions to the problems and issues confronting a wide range of decision-makers and their organizations. We also tackled issues of great and growing concern to the nation: national and international security, water, energy, and the environment.

Our work is, as always, based upon solid data. CNA has a tradition of collecting, cleaning, and archiving data that can be used to examine conditions today and to look at trends over time. We can look back and observe the relationships among numerous factors and project forwards to predict the effects of decisions made today.

All of our analysts draw upon their extensive academic expertise and the synergy that comes when interdisciplinary study teams tackle a problem together. But CNA Corporation is not an ivory tower. Researchers who work in the Center for Naval Analyses, the Federally Funded Research and Development Center for the U.S. Navy and Marine Corps, have special opportunities and responsibilities. Each year, 40 to 50 researchers, including physicists, mathematicians, economists, and statisticians, work on site with the nation’s armed forces—at sea and on the ground, at home and overseas. Their work gains power because it is informed by the operational realities the analysts experience working alongside the nation’s fighting forces.

Analysts in CNA Corporation’s Institute for Public Research take the same fundamental approach: working closely with our domestic clients, collecting data, and applying their education and experience in the field and at headquarters. They focus on understanding the problems and providing solutions in homeland security, law enforcement, education, air traffic control, energy, and the environment.

For both our military and civilian clients, CNA Corporation has analyzed how to make the most of shrinking resources in a time of fiscal uncertainty. We look ahead to predict the effects of funding cuts on readiness of personnel and materiel. Our researchers work hard to provide the client with just the help they need, be it a long-term study, a quick answer to a question, or a summary of what’s known on an issue of immediate concern.

This year, we highlight projects that provide good examples of various facets of the way we do our work. We summarize these projects within a narrative that talks about CNA’s approach as we provide analysis that supports decision-makers, their organizations, and the nation.
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2013 in Review

From its beginnings in 1942, CNA Corporation has supported decision-makers, military and domestic, with objective and independent analysis. Our analyses are grounded in data and informed by our analysts’ understanding of the real-life context their clients deal with every day. The sampling of projects in this 2013 Year in Review exemplifies that approach and demonstrates the depth and breadth of our work for decision-makers, their organizations, and the nation.
When CNA analysts meet with a decision-maker to provide analytical support, we work together to understand and frame the problem. The CNA study director then formulates a project plan and assembles a team of researchers with the mix of skills to address the issue. These analysts find or collect data that can be brought to bear, then apply their analytical and academic expertise. As the study progresses, we continue to work closely with our sponsor to fine-tune the analysis, report interim findings, and adjust our approach as needed. The result is relevant, data-driven, objective analysis the decision-maker can rely on to shed light on the difficult issues he or she faces.

Helping figure out the problem

Decision-makers come to us with either a defined problem or a suspicion that something is wrong, inefficient, or needs improvement. We work with our sponsors to arrive at a common understanding of the problem and determine the best way to shed light on it. CNA Corporation also initiates projects, either to pursue a new methodology for application to future projects or to investigate an issue that we believe is important, but that doesn’t have an obvious sponsor. The projects described here illustrate these starting points.
Clearly defining the problem

Helping the Army Enlist and Retain Speakers of Critical Languages

In some parts of the world, the language, traditions, social customs, and religion are very different from what many Americans are used to. In such places, military interpreters and translators can—and do—save lives through their abilities to talk with and listen to local people, understand nuances and body language, and teach U.S. military personnel to respect customs and taboos. The Under Secretary of Defense for Personnel and Readiness asked CNA to evaluate an Army program for recruiting native and heritage speakers of critical languages (such as Arabic, Dari, Farsi, and Pashto) into the Individual Ready Reserve.

The Army initiated the program in 2003, and in 2005 established the 09L (interpreter/translator) military occupational specialty for native and heritage speakers of the critical languages. Initially, the Army relaxed some enlistment requirements for the 09L program. In particular, it allowed the enlistment of 09L recruits whose low scores on the Armed Forces Qualification Test put them in Category (CAT) V—something that would disqualify a recruit in other fields. The Army stopped this practice in 2008, but soon began having trouble gaining recruits who spoke Dari, Farsi, and Pashto. Thus, in 2010, it requested and received permission to once again enlist CAT V recruits as part of a new 09L program.

CNA evaluated this new pilot program, as well as the 09L program more broadly. We conducted policy analysis, did a statistical analysis of personnel data, and held structured discussions with subject matter experts. Our findings show that CAT V 09L recruits do not perform as well as non-CAT V 09L recruits and are less likely to complete training. That said, the findings suggest that—for languages that are in short supply in the U.S. population but are required for military operations—the accession of CAT V 09Ls offers a viable means of procuring additional uniformed translators and interpreters who can respond quickly in a crisis.

What and How Many Prison Facilities Does Colorado Need?

Colorado’s prison population has dropped significantly over the past four years, leaving the state with substantial excess capacity. Should it close some of its prisons? CNA helped the Governor’s Office of State Planning and Budgeting make a
long-term plan to determine the need for additional facility closures and to establish a framework for future decisions on the size of the state prison system. Our review showed that the current operational capacity of the prison system is roughly in balance with the current inmate population level. Given projections indicating that the size of the prison population will likely stabilize over the next few years, we concluded that no further prison closures appear necessary. However, in the event that additional closures should be needed, we identified those facilities that the state could close without significant negative impact to the overall correctional system. We also estimated the economic impact of potential closures on local communities. The results of the study were presented to the Colorado Legislative Joint Budget Committee in June 2013 and made public through the agency’s website. The study will serve as the basis for the establishing a prison capacity plan and budget for the Colorado Department of Corrections in the state’s upcoming fiscal year.

A suspicion that something is wrong

How Can DOD Attract Civilian Workers to Guam?

By 2020, many Marines stationed in Japan are scheduled to relocate to Guam. In turn, there will be a large increase in the number of Department of Defense (DOD) civilians needed to support those Marines. Finding highly qualified state-side civilian personnel willing to go to Guam has purportedly been challenging, in part because Guam is a U.S. territory and stateside civilian transfers do not get a housing allowance as they would in other overseas assignments.

Commander, U.S. Pacific Fleet, asked CNA to assess whether DOD’s current incentives could attract a sufficient number of civilians to Guam. We found that the situation is less severe than was thought—as a matter of fact, positions that rely on stateside civilian transfers were being filled at nearly the same rate for Guam as for Japan, and by civilians with the same level of qualifications. We also found that affordable base housing is usually available to civilians on Guam, which helps make up for the lack of a housing allowance. Finally, we found other types of incentives and special rates that DOD could use to attract civilians to Guam. In response to our recommendations, our sponsor has decided not to attempt to get an overseas housing allowance for U.S. territories, such as Guam.
CNA sees a need

Making Sure Navy Personnel Can Prepare for Deployments

CNA had been working with the Marine Corps to determine whether administrative tasks and day-to-day activities were keeping personnel from adequately preparing for deployments. We wondered if the Navy had the same problem and decided to explore the issue for Navy personnel.

Using the methodology we had developed for the Marine Corps study, the study team combined qualitative data from interviews with quantitative data to examine possible time constraints for three focus communities that spanned the fleet and leadership levels: cruiser/destroyer chief petty officers and lead petty officers (CPOs/LPOs), strike fighter squadron department heads, and carrier strike group staff. They found that Navy personnel (specifically, the CPOs/LPOs and squadron department heads) have constraints similar to those identified for the Marine Corps, although the drivers of these constraints differ. For the Navy, constraints are largely a result of the burden of regular, day-job responsibilities that meet or exceed even a 12-hour work day, exacerbated by insufficient manpower and deficiencies in supplies and repair parts.

Because our data and resources were limited, our findings were largely preliminary and we would need to do further analysis to better understand the problem and propose solutions. However, our work on this study gained the attention of Navy senior leadership, and we participated in a working group established by the Chief of Naval Operations to look at reducing administrative distractions and to alleviate some of the burden of day-job responsibilities felt by Navy personnel. The initiative is intended to allow more time for the fleet to focus on its warfighting mission.

Mining Social Networks for Theater Operations

Understanding the behaviors and perceptions of populations in regions of interest is essential to modern defense strategies, and the growth of social media around the world presents an expanding and largely untapped data source for intelligence and information operations. CNA thought it would be useful to the Department of Defense if we assessed the potential utility of such data to military operations. Areas of military interest include the use of social media in public affairs, internal communications and collaboration, cyber espionage, humanitarian assistance and disaster response, psychological operations, and open-source intelligence. We also conducted an in-depth review of various examples where social media were used in monitoring and shaping real-world events, concluding that those same tools had mixed results in anticipating and predicting events. Finally, we note that social media analysis and tools are in an early stage of development, and significant research and development still lies ahead, efforts that will require multi-year funding and support. Thus we recommend selective and focused efforts on data harvesting, analysis, and exploitation, along with monitoring and leveraging the social-media efforts of other organizations.
Unconventional Warfare and Counterinsurgency in Pakistan

Pakistan is an important player in Southwest Asia, and its policies towards militant groups are of particular interest as U.S. forces draw down in Afghanistan. This CNA-initiated project traced the history of the Pakistani government’s support for various militant groups since 1947 and its efforts against some of these organizations, with a focus on the 2001-2012 period. Our report identified major currents in Pakistan’s strategic thinking in regard to various militant organizations over time, the evolving nature of these groups, and major operations against them in the last 10 years. It concluded with implications for the drawdown of Western forces in Afghanistan.

Uncovering the data

CNA analyses are “data driven,” not driven by our subjective opinions. We seek out and use objective data and develop courses of action that address the root causes of the problem. Relevant data may exist, unnoticed, within the client’s organization, but frequently the needed data reside somewhere else—at a subordinate unit, a higher headquarters or even a completely separate organization—or new data must be collected in a field environment. If the data exist, we’ll find, organize, and vet them; if not, we’ll work with the sponsor to design a plan so we can collect new data in the most efficient way.

Tracking down existing data

Tiered Personnel Readiness in the Marine Corps

The Commandant of the Marine Corps has stated that non-deployed Marine Corps units should be ready to respond “on a moment’s notice” to unanticipated crises and that, as a result, there should be no “tiered readiness” across units. Tiered readiness occurs when deployed units and units in the final stages of workup before a deployment are at higher levels of readiness than other non-deployed units. As a result of the Commandant’s concern, CNA was asked to explore the extent of tiered personnel readiness within the Marine Corps and the potential manning issues associated with avoiding it. Beyond the readiness issue, we were asked to address the issue of leadership presence within non-deployed units.

The study team focused on infantry units to explore this question. They used the Marine Total Force Data Warehouse (archived at CNA) to look at how many Marines of which ranks were assigned to units of the 2nd Marine Regiment at varying points in the deployment cycle. This database permitted them to assess unit readiness using several different definitions of deployability, as well as estimates of the leadership presence in each unit. But centralized data provided only limited information on why Marines might not be with their assigned units and thus not be deployable with that unit. To address this issue, analysts discovered a database at the regiment that kept track of these
Marines and their whereabouts. With this information, they were able to provide the sponsor with estimates of the number and rank of personnel unable to respond “on a moment’s notice” with their assigned units. The data also highlighted the impact of external personnel demands on leadership presence within Marine units.

**Helping the Navy Allocate Resources Wisely**

The Navy supports over 600,000 people in over 4,000 units, and it occupies over 115,000 facilities in hundreds of locations around the world. Every year, the Navy’s Shore Readiness Division spends more than $8 billion managing these facilities. But wise allocation of resources is difficult, because no single data source provides location information for all units. Data on personnel, facilities, deployments, and base operating costs exist in different databases, under the management of many different offices. In this project, CNA analysts developed a reproducible methodology for determining which units are assigned to each installation and determined how to link infrastructure costs and requirements to the units. With this method, the Navy can better manage people and infrastructure requirements. The database can also be used to estimate infrastructure support costs for each unit.

**Collecting data at the source**

**The Inaugural Deployment of the First Littoral Combat Ship**

USS *Freedom*, the first of a new class of littoral combat ships (LCSs), recently deployed to Singapore for 10 months. The LCS is a new type of ship designed to operate in the littoral, or near-shore, shallow-water area. It is a fast, maneuverable ship with an advanced capability to network with other ships and aircraft. It can undertake a variety of missions—antisubmarine warfare, surface warfare, or mine warfare—with a minimum of reconfiguration. There are also multiple crews for a single ship, allowing the vessel to remain forward deployed for extended periods of time.

Many questions remain about manning concepts, the ship’s maintenance model, and the utility of the vessel for operations in littoral environments. CNA is evaluating these and other issues to inform future deployments and perhaps even modifications to the ship class. To collect the necessary data for this evaluation, we have deployed analysts for extensive periods throughout the ship’s deployment, including during the crew rotation. Our preliminary observations highlighted
concerns over the durability of ship equipment, maintenance demands imposed on the crew, and the division of labor between the ship’s company and mission-module personnel.

The Navy’s First Dedicated Afloat Forward Staging Base

In response to mine threats and other dangers in the Arabian Gulf, the Navy deployed its first dedicated afloat forward staging base (AFSB), a converted amphibious ship. USS *Ponce* has been operating in the Gulf for the last year in mine warfare and other roles with a hybrid crew of Navy and Military Sealift Command personnel. We were asked to conduct an operational assessment that will inform designs of future dedicated AFSBs. The great majority of our data came through CNA analysts who rode onboard *Ponce* during key scheduled events. From analysis of data and our on-scene observations, we evaluated that the vessel met most of its mission requirements.

A particular area of interest is the AFSB’s manning concept: civilian mariners from Military Sealift Command control many of the ship’s functions, while a U.S. Navy staff plans and executes the missions. During the part of the *Ponce* deployment that we covered, we found that relationship worked well; however, the relationships established under the hybrid crewing concept will likely depend on the personalities and experiences or backgrounds of the MSC Master and Navy Commanding Officer. Though the civilian mariners are responsible for multiple functions
(e.g., well deck, flight deck, and crane), they are limited by numbers and experience in being able to conduct simultaneous operations. For these and other reasons we recommend adding a military detachment to the uniformed crew to execute flight deck operations.

**Impact of Information Assurance Shortfalls on Mission Accomplishment**

Warfighters rely on many different information technology (IT) systems to gather and process data, communicate, visualize the battlespace, consider possible courses of action, and make and carry out decisions. But sometimes failures in the systems keep them from being interoperable or providing the warfighter with secure, accurate, and timely information—that is, they no longer maintain “information assurance.” These failures can be caused by malicious cyber attacks; however, they often occur simply because system users don’t see the importance of following the required procedures and regulations.

For the past 10 years, the Director of Operational Test and Evaluation (DOT&E) has been conducting assessments of interoperability and information assurance during major exercises. CNA has been assisting this effort by collecting data on-site during exercises. The data clearly show how even relatively modest shortfalls in interoperability and information assurance can greatly affect the outcome of a military operation. Our analysis was included in DOT&E’s end-of-year report and is being used to motivate development of new procedures for dealing with cyber issues.

**Assuring Navy Communications**

During the past decade, Navy afloat forces have enjoyed good networked connectivity because of investments in satellite communications. Over time, the fleet has become increasingly dependent on these capabilities. Yet the Navy must be able to operate in areas where opposition forces can severely degrade or even deny communications to the fleet through cyber threats, electronic jamming, or physical attacks on infrastructure.

The Navy asked CNA to assess the ability to maintain critical command-and-control connectivity with ships and afloat task forces in a communications-degraded environment. We worked with deployed strike groups to characterize operational communications performance in both a benign and a degraded environment. In the process, we uncovered technical limitations, suggested ways to overcome them, and provided detailed steps to enable a ship to adjust to degraded communications. As a result of this effort, the Navy conducted a more extensive at-sea test under a range of stress conditions. Nine CNA analysts supported the exercise, collecting data and observations on the operational impacts and technical performance of the various communications systems. We noted that ships that implemented our recommended procedures had better connectivity, and we recommended additional steps to improve the fleet’s performance when communications are degraded or denied.
Attracting and Retaining Navy Medicine Personnel

In a follow-up to a 2008 CNA study of job satisfaction, we conducted a survey of all Navy Medicine personnel and convened more than 100 focus groups across Navy Medicine’s federal employees and active duty personnel from the Medical, Dental, Nurse, Medical Service, and Hospital Corps. The study results indicate that most measures of job satisfaction have increased from their 2008 values by as much as 20 percent. Satisfaction increased across all groups but particularly among senior personnel. We also found double-digit increases in morale and satisfaction with available assignments among the active-duty personnel. The themes that emerged from the focus groups indicated that job security and retirement benefits were among the most significant influences on a participant’s desire to stay with Navy Medicine. In addition, physicians, dentists, nurses, and other clinicians identified a need to encourage the development of more clinical career and promotion paths as a way to retain clinicians who want to remain in patient care rather than move into administration. These providers often see getting out as the only way to continue practicing medicine. Together, the survey and focus group findings provide the Navy’s Bureau of Medicine and Surgery with the rich contextual information it needs to adjust to the changing labor market.

What expertise is needed?

CNA analysts draw on their wide-ranging subject matter expertise in their quest to find solutions to our clients’ problems. First, we exploit our highly qualified staff’s academic knowledge in disciplines ranging from physics and chemistry to economics and political science: 70 percent of our researchers have Ph.D.s, and 28 percent hold one or more master’s degrees. Second, we rely on the experience our analysts gain from serving with our nation’s operating forces in our unique field program. At any one time, CNA has 40 to 50 analysts serving as field representatives for two- to three-year tours with Navy, Marine Corps, and Joint commands. We deploy these analysts to operational commands around the world to support military decision-makers on
site and, in times of crisis or conflict, dispatch additional analysts, both to provide real-time analytic support and to collect data for future reconstruction and analysis. Finally, if additional perspectives are needed for context, we’ll organize workshops or conferences with practitioners and academics intimately familiar with the relevant operating environment and document the proceedings for future reference.

Academic expertise

Maximizing Aviation and Ship Budgets

In FY 2012, the Navy spent over $51 billion to operate, maintain, modernize, and procure replacements for its ships and aircraft. Managing the fleet requires decisions on how many ships and aircraft to buy and retire, how much to operate them, and how much to spend on maintenance and modernization. These decisions influence the size, characteristics, and value of the future fleet. For instance, a decision to reduce procurement and instead perform service-life extension programs on existing aircraft will result in a larger, but older and less modernized fleet.

Similarly, a decision to defer ship maintenance may force earlier retirements of those ships and additional ship purchases. Until now, there has been no way to compare the consequences of different decisions in a systematic fashion. CNA researchers (economists and an engineer) developed models that provide one way of comparing these consequences—the costs and values of the different fleet sizes and characteristics. The models incorporate procurement, retirement, maintenance, and modernization. The Navy can use these models to evaluate the feasibility and effectiveness of its ship and aviation plans.

Helping Keep Ballistic Missile Submarines Safe From Threat

For years, CNA scientists have helped the Navy assess threats to its ballistic missile submarines (SSBNs) and find ways to mitigate those threats to ensure that the nuclear deterrent force remains secure at sea. We use a mix of classical operations research techniques and advanced modeling and simulation results to estimate the probability that threat forces can detect, localize, and track deployed SSBNs. If a threat arises, we help
the Navy analyze and assess a mix of changes in tactics and technology to neutralize that threat. The Navy uses our results to assess operational risks and decide which technologies should receive priority for development and procurement.

Field experience

Can the Navy Keep Its Aging F/A-18Cs Ready?

The Navy’s F/A-18C aircraft are aging and needing more maintenance at the same time that maintenance manning is declining. CNA’s field representative to Carrier Strike Group ELEVEN (CSG-11), aboard USS Nimitz, tracked the readiness of the F/A-18Cs during the carrier’s deployment. In particular, he analyzed trends in readiness rates and in maintenance manning across the various work centers. With support from analysts at CNA headquarters, he developed a Navy-wide historical overview of F/A-18 readiness that puts the squadron’s results in a broader context. He also studied the effects of consecutive flying days on aircraft readiness and compared the older Hornets to the newer Super Hornets. CSG-11 used this work to plan flight schedules and extrapolated it to determine maximum air-wing endurance in operational settings.

Analyzing Changes in TOPGUN Student Performance

The most accomplished naval aviators are nominated by their commands to attend weapon schools at the Naval Strike and Air Warfare Center (NSAWC). They undergo rigorous training regimens, and the graduates are expected to be subject matter experts, “train the trainers” and become leaders in the aviation community. The Navy posed a question concerning student performance trends and attrition rates at the Fighter Weapons School (TOPGUN), and asked whether an approach could be developed to quantify related observations and identify underlying causes for recent performance experience. The CNA field representative to NSAWC conducted a detailed analysis
TOPGUN student performance that showed significant changes in grades and attrition rates over the last decade. The analytical results established a new indicator of air-to-air readiness in the fleet and contributed to improvements in the TOPGUN curriculum. The NSAWC leadership presented the approach and implications to the Commander, Naval Air Forces, and the naval aviation community is considering use of these results to shape inputs to major defense review processes.

A New Life for the Navy’s Blimp?

In 2006, the U.S. Navy began using an airship, or blimp, designated MZ-3A, as a flying laboratory to test new sensors and technologies. But in 2011, only months after the official unveiling of the MZ-3A, the Navy decided to deflate it and mothball the program. Even though the blimp worked well, there no longer seemed to be a compelling mission for it. Then, Naval Forces Southern Command/Fourth Fleet asked if the blimp could help spot drug-running boats off the coasts of South and Central America. If so, it would be much more fuel efficient than the surveillance aircraft now used. Recently, Fourth Fleet hosted the MZ-3A for a capabilities demonstration. The CNA field representative to the command constructed the test scenarios and analysis plan, and collected data during the demonstration. Southern Command will use the analysis to make an informed decision about using the MZ-3A for its counternarcotics missions.

Workshops and conferences

Maritime Security in East Asia

East Asian security concerns in the maritime domain have taken on particular salience over the past year with Japan nationalizing the Senkaku/Diaoyu Islands in the East China Sea and China reacting with increased civilian maritime and military presence in the area. Because of the maritime dimension in East Asian security, CNA hosts workshops to explore these issues in depth. These workshops bring together recognized experts as well as the U.S. and Asian government officials responsible for managing the issues. This year, CNA held two Maritime Asia workshops: The first explored Japan’s three territorial disputes with its near neighbors and considered the implications of these disputes for the U.S.-Japan alliance. The second, Maritime Security Issues in East Asia, was conducted in collaboration with the Sea Lanes of Communication Study Group from Yonsei University in Seoul. This workshop explored potential flashpoints at sea in Northeast Asia and the prospects for their resolution through international legal means. We documented both workshops in CNA publications.

Land Power in the Pacific

CNA convened a workshop of subject-matter experts from the U.S. government, including the military services and the intelligence community, academia, and think tanks to address the future of the U.S. Army in the Asia-Pacific region. Key questions addressed by the workshop’s panelists included: What does the emerging Asia-Pacific security environment look like and what are
the implications for the U.S. Army? What political-military and operational dimensions does the U.S. Army need to prepare for in Asia? What should be its role there? CNA analysts summarized themes and key findings in the report.

Focus on the sponsor

Though CNA’s charter is to provide our customers with independent and objective analysis, that does not mean we disappear for months while working on the problem, and pop up with an “answer” at the end. Instead, we partner with our clients, keeping them informed of our progress every step of the way and adjusting our approach as we learn more about their needs and the problem at hand. If the sponsor desires, our research will remain confidential; we will not release any of our work to a wider audience without their permission.

CNA has the benefit of a 70-plus-year relationship with the Navy and Marine Corps, and our defense sponsors likewise gain from this long-term partnership. This shared history gives us continuity and extensive knowledge of these clients’ problems and the skills to tackle them. We encourage our researchers to spend a significant portion of their careers directly helping our sponsors where they work, in the United States and around the globe. We have learned that analysis is more powerful and persuasive when coupled with the experience of working in our sponsors’ operating environments. Our approach yields further dividends when the decision-maker doesn’t need a full-fledged study, just a quick answer to a question or a summary of existing analysis on an issue of immediate concern. Living in their world, CNA is able to provide the responsive, analytically informed help they need.

Partnering with the sponsor

Asia-Pacific Rebalancing: Implementing a Global U.S. Navy Strategy

The Obama administration announced a rebalance toward the Asia-Pacific region in January 2012, which signaled a potentially significant shift in U.S. global security strategy. The Chief of Naval Operations’ (CNO’s) Director of Strategy and Policy asked CNA to review current U.S. guidance on the rebalance and develop a long-term strategic framework to support the Navy’s implementation of it. For this project, we selected a study director who had direct experience with U.S. military policy and operations in the Pacific, having previously served as field representative to the Commander, U.S. Pacific Command. To tackle this problem, he worked closely with the client on site at the Pentagon. He developed a methodology whose centerpiece is a blueprint designed to identify key programmatic and policy milestones around which the U.S. Navy would construct a long-term implementation “roadmap.” CNA’s broad objective is to enable the CNO to account for internal and external planning factors such as budgetary constraints,
other services’ contributions and interests, global and regional geopolitical evolution, and the impact of rising regional and global powers on the progress of the rebalance initiatives.

**Can a Company-Sized Landing Team Be an Independent Unit?**

Until recently, a battalion was considered to be the smallest unit that could act independently. Now, the Marine Corps is putting an emphasis on using smaller command units at the start of an operation. CNA analysts who work on site at the Marine Corps Warfighting Laboratory are helping analyze tactics, techniques, procedures, and technologies required for company landing teams, which may be acting far from their headquarters, to do their jobs by using digital networks. These researchers are also analyzing a platoon’s ability to process and synthesize information from a system of unmanned sensors, unmanned ground vehicles, and unmanned air vehicles to improve the platoon’s mobility, logistics, situational awareness, and tactical decisions. This work is helping the Warfighting Lab determine which technologies and concepts to continue to examine.

**Long-term relationship**

**Changes to the Marine Corps’ Women-in-Service Restrictions**

For more than 20 years, the Navy and Marine Corps have come to CNA for analysis of gender and ethnic diversity issues. This background was called upon when the FY11 National Defense Authorization Act directed the Secretary of Defense and the service secretaries to “review laws, policies, and regulations that may restrict the service of female members.” The Marine Corps formed an operational planning team and requested CNA’s support in April 2011. This support ultimately evolved into a CNA study for the Assistant Commandant of the Marine Corps, which began in September 2011.

In this effort, we provided information to help the Marine Corps decide whether to change its women-in-service restrictions and, if it did, to better understand the effects of those changes on recruiting, retention, manpower management, and training processes.

We published documents summarizing key issues and initial analyses as well as the relevant
practices of foreign militaries and other organizations. We also designed, fielded, and analyzed a force survey of all active-duty and Selected Reserve Marines. Finally, we published a document outlining key findings and next steps. Material drawn from these reports became part of the Marine Corps’ report to the Secretary of Defense. We continued our support by reviewing and commenting on the Marine Corps implementation plan, released in June 2013.

Governance and Service Delivery in Helmand Province

Since 2001, CNA has deployed analysts to Afghanistan to serve on the ground with coalition headquarters, Marine forces, and Provincial Reconstruction Teams, helping with such issues as countering improvised explosive devices (IEDs), minimizing civilian casualties, and developing withdrawal strategies. As those analysts return to CNA headquarters, our clients continue to draw on their expertise. In this 2013 project, the Marine Corps asked us to explore what governance and service delivery in Helmand province will look like as the Marines continue to draw down in the area. Our reports are helping to inform Marines and other coalition forces as they work to prepare for the post-2014 period.

Our analysis suggests that governance in Helmand and other areas of Afghanistan will likely revert to a system of “mixed sovereignty” wherein both the formal state and informal power structures (e.g., tribes, patronage networks, and religious entities) maintain power and legitimacy in the eyes of the population. We also concluded that the ability of the Afghan government to provide basic services is likely to decline somewhat over the next few years, but we do not expect a small decline to turn public opinion against the government. Ultimately, the Afghan government’s ability to maintain order after coalition forces withdraw will likely be the decisive factor in whether it maintains popular support.

Providing just what’s needed when it’s needed

Incorporating New Escorts Into the Carrier Strike Group

Usually before a carrier strike group (CSG) deploys, the aircraft carrier and all its escort ships conduct extensive training, or “work up,” together. Recently, however, USS Nimitz was delayed due to repairs and all but one of its escorts deployed before the carrier was ready. Because of this, as Nimitz transited the oceans during its deployment, it was assigned one set of escorts in
Third Fleet, another in Seventh Fleet, and a third in Fifth Fleet. CNA’s field representative onboard the carrier analyzed the readiness of the escorts joining the strike group and developed a way to measure the ability of the ships and staffs to operate together on a more ad hoc basis. The strike group staff used this work to better understand how escorts that do not participate in the pre-deployment work-up could be incorporated into the CSG.

**Responding to Crises in the Western Pacific**

In his recently completed three-year tour, CNA’s field rep to Third Marine Expeditionary Force, based in Okinawa, Japan, was part of their crisis action team (CAT). The CAT is activated as needed to respond to all manner of incidents, from tension on the Korean peninsula to such natural disasters as the Fukushima reactor crisis and Sendai tsunami. Shortly after a significant cross-border incident on the Korean peninsula, the CAT was called in to plan the U.S. Marine Corps response, which involved deploying forces to the area in question. The CNA field rep provided operational assessment expertise in the planning and execution of these operations. He was tasked to quickly help develop the alternative courses of action for employment of those forces.

**Scientific Analysts in Support**

Besides its embedded support to field commands, CNA provides support to Pentagon offices through its scientific analyst (SA) program. There are two types of SAs: analysts who work full time at the decision-maker’s site for two or three years, and others who provide continuing support on a part-time basis. All are senior researchers who are very familiar with the client’s responsibilities and concerns and are available to respond quickly to a specific question or to provide immediate access to CNA expertise as needed.

In 2013, CNA scientific analysts provided the senior leaders they support with the specific information they needed on a myriad of topics. These included: the age of Navy recruits over the past decade; trends in installation support costs; the performance of male and female Marine recruits on physical fitness tests; the challenges of the flexible ship concept; and potential savings from the increased use of simulators. SAs in 2013 also provided summaries of existing analyses on many subjects, including surface ship modernization, the business case for analyses of alternatives, and retention and reenlistment rates by dependent status.
Beyond helping individual decision-makers, CNA analysts tackle complex problems that reverberate throughout an organization. We help organizations as they determine how best to allocate scarce resources and understand the operational consequences of budget decisions. We use our experience and skills with collecting, vetting, and archiving data to help organizations maintain their institutional memory to learn from the past and extrapolate into the future. The CNA Corporation also uses its experience working with a range of organizations across government to provide an interagency perspective on solving problems.

Coping with diminished resources

In the existing austere financial environment, organizations need to determine their bottom-line priorities for funding. They also increasingly need to justify requests for resources, and show, rather than assert, potential losses in mission effectiveness if those resources are cut. We work with our sponsors to collect and analyze data showing the operational impact to their organization resulting from actual and proposed cuts. Then, we help develop analysis-
based mitigation strategies, supplying data-driven analysis that can be used as part of a case for appropriate levels of resources. That analysis is independently developed, objective, and credible. Objectivity matters to us, and we are always straight with our clients, even if the analysis comes to a conclusion different from their expectations.

Our work in this area highlights two of CNA’s strengths: our understanding of operations, which allows us to go beyond the dollar amounts to reveal the impact of budget decisions, and our long-term relationship with the Navy and Marine Corps, which has provided us with deep expertise and past analyses on which we can build.

Understanding operational impacts

Mitigating the Effect of Cuts in Flying Hours

Because of sequestration, several Navy carrier air wings and squadrons have had their flying hours significantly reduced. The Navy has seldom been forced to operate for long periods at low flight hours; therefore, it has little experience in deciding how to structure flight training and how best to recover when funding returns to normal. However, there is a precedent: flying hours were also reduced because of budgetary pressures during fiscal year 2009. We used the results of a 2009 CNA study and our analytic understanding of the relationship between flight hours and safety, tactical proficiency, and readiness, to help the Navy develop guidelines for fleet squadrons for flying while at reduced hours. We also evaluated how to safely recover from an extended period at reduced funding (or a complete flying shutdown) and rebuild tactical proficiency before entering complex pre-deployment training events. In addition, we analyzed advanced training events for an air wing just before deployment. We showed how the training objectives of those events increase in a building-block fashion, how expenditure of resources (e.g., flight hours and ordnance) affect performance at the next step, and how flight simulators can be better used to complement real flights.

The Effects of Increased Fuel Efficiency on Operational Capabilities

The U.S. Navy is reviewing a number of energy efficiency initiatives as part of its efforts to
reduce fossil fuel consumption. The benefits of such initiatives are twofold: they save money in peacetime and increase capabilities in wartime. This study focuses on the latter. Specifically, the Navy Energy Coordination Office asked CNA to develop a framework for quantifying how increased fuel efficiency could affect combat effectiveness. They also asked us to use the framework to quantify the effects of fuel efficiency on core naval missions. This study, therefore, highlights the primary logistical and operational benefits of fuel efficiency and quantifies those benefits for a notional carrier strike group (CSG).

Our study provided an initial analysis of the logistical and operational benefits of fuel efficiency for a notional CSG conducting maritime and air operations. We examined the effects of a range of fuel efficiency improvements (from 0 to 30 percent) and thereby kept our analysis independent of the acquisition timelines for specific initiatives. We found that most benefits of increasing fuel efficiency are continuous. For example, increasing fuel efficiency means that aircraft can remain on station longer before needing to refuel. Some benefits, however, are discontinuous, which means they have break points where a certain fuel efficiency gain causes a step change. For example, a certain level of fuel efficiency enables aircraft to remain on station for an additional carrier deck cycle or allows a strike group to resupply with one fewer oiler.

This study gives resource providers and systems developers a way to understand how fuel savings will affect combat performance of individual platforms. This insight is changing the way the Navy thinks about fuel efficiency by helping move the conversation from cost savings to capability.

Utilizing CNA Corporation’s deep expertise

What Are the Impacts of Budget Cuts on Recruit Quality and the Marine Corps?

CNA has provided the Department of Defense, Navy, and Marine Corps with actionable analyses on manpower and personnel since the All Volunteer Force was studied by the Gates Commission in 1973. This work is of particular value when the services must take budget cuts and reallocate resources to yield efficiencies. The Marine Corps asked for our help in evaluating how the effects of resource cuts may vary depending on where they occur. We focused on the Marine Corps Recruiting Command (MCRC), which may be more at risk for cuts than other Marine commands.

Using a CNA database that tracks Marines as they progress through their careers, we found that high-quality (HQ) recruits are more expensive to gain but provide a greater return on investment than their low-quality (LQ) counterparts. HQ recruits are less likely to be subjects of attrition, both during bootcamp and in their first terms; this yields savings for the USMC, because attrition is costly. In addition, HQ recruits are less likely to receive non-judicial (i.e., non-court martial) punishments or be demoted—processes that entail significant
administrative costs and potential morale effects on other Marines. HQ recruits are also more likely to be rifle experts by the end of their first terms and to be promoted sooner. Thus, despite the higher recruiting expense, gaining an HQ recruit rather than an LQ one likely saves costs for the enterprise. We also examined several scenarios (using several combinations of advertising resources, recruiter numbers, and unemployment rates) that illustrate different conditions under which the Marine Corps could miss meeting recruit quality standards. This analysis has proved useful in helping decision-makers to consider trade-offs as part of their budget process.

**Using Historical Deployment Strategies to See Options for the Future**

In this ongoing project requested by the Under Secretary of the Navy, we are updating an earlier CNA effort. That earlier study, published in 2003, examined the evolution of U.S. deployment strategies over time (since 1775) and, from those strategies, determined a series of possible alternative deployment models for the Navy of today and tomorrow. The update refreshes the earlier analyses, using insights from subsequent historical literature, and relates the findings more closely to contemporary issues facing the naval services. It also integrates U.S. Marine Corps deployment strategies more comprehensively into the analysis. It shows that during the first 125 years of U.S. naval operations, Navy and Marine Corps deployment strategies were closely linked (although not completely congruent) but that during the 20th century their strategies often differed, sometimes markedly.

As part of this project, we conducted four workshops, which have enabled us not only to update and improve our data and analysis, but also to disseminate our earlier study and our most recent interim findings. This analysis is already helping the U.S. Navy and Marine Corps better understand the pros and cons of their current deployment strategies—especially in the present climate of evolving threats and declining resources—as well as possible alternatives to consider.

**Maintaining institutional memory**

Besides addressing discrete problems, CNA can help an organization develop and maintain its institutional memory of past actions and operations. When we analyze the issues, we collect, compile, and store data that we can use to help our clients answer requests for information. These data sets also enable much richer analysis. For example, we archive Navy and Marine Corps manpower, readiness, and deployment data and use the data to help the services understand performance trends over time, or as a basis to predict likely outcomes of a range of decisions. Our decades of experience supporting government with its toughest problems give us insights into which data are likely to have enduring value and how best to ensure data quality; thus we take responsibility for saving and organizing the data for easy retrieval, to provide ongoing support with quick-response or in-depth analyses.
Responding to requests for information

A Demographic Profile of Transitioning Sailors at Risk of Unemployment

The Navy asked us to analyze the characteristics of separated or retired sailors who collected Navy-paid unemployment benefits in 2011. Our sponsor was especially interested in the characteristics of “at risk” sailors who collected extended unemployment benefits (i.e., who collected benefits for more than 18 months). To conduct this analysis, we merged data from the Navy Bureau of Personnel identifying roughly 30,000 Navy unemployment recipients with extensive Navy personnel data archived at CNA. Our final document characterizes this population across a variety of dimensions, and will prove useful as the Navy tries to better serve this population.

Leveraging Historical Fleet Employment Data to Support Navy Leaders’ Decision-Making

CNA has collected and archived large amounts of data on fleet activities since 1976, using the information in a wide range of projects. We also use the data to support ad-hoc requests for information from the Navy headquarters staff—some prompted by congressional inquiry—as well as from CNA scientific analysts, field representatives, and project directors. These databases are particularly important for rapid responses using historical trend analysis. Over the past year, for example, we answered questions for the Chief of Naval Operations and the Secretary of the Navy related to aircraft carrier operations, amphibious ship deployments, surface ship mishap rates, suicide prevention, trends in the number of Navy personnel deployed worldwide, and the impact of sequestration on Navy operations. By digesting and providing access to this information, CNA can respond rapidly to the concerns of Navy leadership using operational data.

Does II MEF Efficiently Use First-Term Marines?

The Commanding General, II Marine Expeditionary Force (II MEF), wanted to know whether the command is efficiently employing first-term Marines. Our II MEF field representative received from CNA headquarters 10 years of accessions records and reconstructed the deployment history of all Marines during their first enlistment. He found that these Marines are used inefficiently; that is, most first-term Marines do not deploy the suggested maximum of three times. The analysis showed that the inefficiencies are driven by the fact that first-term Marines are not eligible to deploy if their end-of-active-service date would fall during a deployment or within a certain time afterwards. Fixing the problem would require coordination across the entire Marine Corps. The general is using this analysis to better align East Coast infantry battalion deployment schedules for the future.

Understanding trends over time

Have Changing Levels of Maintainers’ Experience Affected Aircraft Readiness?

Maintenance personnel in aviation units do day-to-day inspections, servicing, and preventive maintenance on the aircraft, to keep them
reach the end of their enlistment term before their prescribed sea tour ends. If they decide not to reenlist, they have to be replaced at sea. This not only is financially costly to the Navy but can also reduce readiness. The Navy asked CNA whether—and how—enlistment contracts could be better aligned with the length of sea tours.

After studying 10 years’ worth of data, we concluded that the Navy has made longer enlistments worthwhile to the sailors through enlistment incentives and the value of training. We also found that enlistment bonuses constitute a cost-effective and flexible way to lengthen sailors’ contracts so they completely cover the prescribed sea tour. Our analysis suggests that such enlistment bonuses will continue to be effective even as civilian economic conditions improve.

Working with other organizations

Today’s complex problems increasingly require joint or interagency solutions. For example, such security problems as piracy, trafficking, and terrorism sit at the intersection of national defense and law enforcement—and they frequently draw on capabilities, such as operational. Sometimes their work is augmented by outside technical assistance. But aircraft readiness has decreased over the past few years, and Navy leaders asked us to find out why.

For this project, we used CNA’s historical databases on personnel and on aircraft readiness. We found that fewer maintainers are being assigned to squadrons and that those who are assigned devote fewer hours to maintenance. Furthermore, the number of E4 maintainers has increased by 14 percent while the numbers of E5 and E6 maintainers have both dropped by more than 25 percent. This has happened even though more aircraft must now be maintained and annual flying hours have increased. We recommended that the Navy improve the logged maintenance hours per maintainer and explore options for restoring the number of enlisted maintainers in squadrons closer to pre-FY 2007 numbers.

Rethinking the Length of Navy Enlistment Contracts

Sailors usually enlist for a term of four, five, or six years. After initial training, most go to sea for their first prescribed sea tour. But the timing of the enlistment period and that of the prescribed sea tour are not well aligned. A very high percentage—for example, 83 percent of those who started their sea tours in FY 2012—
counter-finance actions, from still other parts of the government. Responses to crises, both overseas and at home, also require coordinated action by numerous entities. An organization is likely part of a complex network, dependent on information and cooperation from other agencies, and perhaps across multiple levels such as national, state, and local. Through CNA’s work across government, at all levels, we promote interoperability and alignment between our clients’ organizations and others.

**Evaluating FEMA Response and Recovery Operations Following Hurricane Sandy**

In November 2012, CNA analysts began supporting the Federal Emergency Management Agency’s (FEMA’s) Sandy Analysis Team, established in the weeks after Hurricane Sandy made landfall. We were asked to review the agency’s preparations for, response to, and recovery from the storm. CNA analysts worked closely with FEMA personnel to collect, organize, and analyze data from myriad sources to identify strengths and areas for improvement in FEMA’s response and recovery operations. FEMA released the Sandy Analysis Team’s final report in July 2013, highlighting both successes and challenges.

**The Navy’s Support to Civil Authorities After Hurricane Sandy**

Once President Obama signed a Presidential Disaster Declaration in the wake of Hurricane Sandy, the Commander, U.S. Fleet Forces, ordered Navy forces to the disaster area via both overland and sea-based transport. He tasked the Commander, Navy Warfare Development Command (CNWDC), to collect lessons learned on the Navy’s response, which was part of the Defense Department’s effort providing Defense Support to Civil Authorities (DSCA). CNWDC put his CNA field representative in charge of the overall collection and analysis effort. Our field rep prepared a data collection and analysis plan and organized a schedule for collecting and sharing data among the effort’s collectors and analysts. Upon the return of Navy forces two weeks later, all collectors and analysts gathered to reconstruct the DSCA response, identify the key lessons learned from the operation, and provide a set of recommendations for addressing shortfalls and areas for improvement. These findings and recommendations were incorporated into a Planning Order issued to the Commander, Naval Expeditionary Combat Command, directing that he develop a concept of operations and Execution Order that would initiate operations for future DSCA responses.
What Policy Should DOD Implement to Support the National Preparedness Framework?

National preparedness is the federal government’s capstone homeland security initiative. While the Department of Defense’s policy documents and joint doctrine refer to homeland security, the department has provided little formal indication of its role in national preparedness. The Assistant Secretary of Defense for Homeland Defense and Americas’ Security Affairs asked CNA to help DOD develop a policy to address this gap.

DOD has existing guidance that covers many, if not all, the roles and responsibilities described by national preparedness policy; however, this guidance addresses these roles on a topic-by-topic basis, often without reconciling them with related DOD activities or connecting them to a wider national effort. Based on our analysis of this guidance and existing DOD issuances, we developed proposed text for a DOD issuance, which would align the department’s policy and related homeland security activities with the National Preparedness System. By synchronizing these policies and linking them to the National Preparedness System, DOD can simultaneously increase its own resilience and enhance the resilience of the nation.

Integrating Special Operations Forces and General Purpose Forces

Challenges arise when Special Operations Forces and General Purpose Forces must work together: Which supports the other? Who has overall command and control? What if they have competing requirements? To help the Department of Defense address these questions, a group of CNA analysts designed and produced a tabletop war game, “Ill Wind.” In the war game, which was played in a seminar setting, 35 military, government, and civilian operators, officials, and analysts explored issues associated with the integration of the two forces. The game addressed a single, complex, and evolving scenario: U.S. forces are acting in an advise-and-assist role to counter insurgency and terrorism in a host nation when a humanitarian crisis occurs. Participants confronted a series of decisions concerning the organization, operation, and integration of Special Operations Forces and General Purpose Forces. They made and discussed decisions and their consequences in the context of the scenario. The game provided valuable insights that will contribute to future DOD policy and training.
CNA Corporation leads analysis and intellectual discourse on tomorrow’s complex problems, across the globe and within our communities, both as a service to the country and to understand the implications for our clients today.

Preparing for future security challenges

CNA’s work on future security challenges focuses on international trouble spots and the interrelated concerns of energy, water, and the environment. Our political-military analysts evaluate what kind of relationships are likely to develop between the United States and potential competitors and collaborators and how decisions made today will influence those outcomes. They look across the globe, at trouble spots of today and tomorrow, anticipate a broad range of plausible outcomes, and offer recommendations that are actionable.

Other CNA researchers examine the relationships among energy and water policy, climate change, and the environment. We also assess the relationship between military training and the environment and review the implications of current energy policies for the Department of Defense as we help formulate energy and environmental management policies for its installations and operational forces.
Dealing with trouble spots

Congressional Study on Afghan National Security Forces

The 2013 National Defense Authorization Act (NDAA) directed DOD to conduct an independent assessment of the Afghan National Security Forces (ANSF)—essentially, to identify the requirement for the ANSF’s size, structure, capabilities, and posture for the next decade. The Office of the Under Secretary of Defense (Policy) asked CNA to do this study. We formed an interdisciplinary research team to address the study’s 10 tasks, deployed a travel team to Afghanistan and Pakistan to gather data and conduct interviews, and established a Senior Review Panel consisting of 10 individuals with prior experience directing high-level government institutions focused on military and police functional areas.

The study team analyzed past and present insurgent threats against the government of Afghanistan to generate a future threat assessment. We used this in conjunction with a force-sizing framework, focused on the prioritization of geographic areas within Afghanistan, to conduct a troop-to-task analysis of the ANSF.

The team evaluated the ANSF against the U.S. policy goal of preventing Afghanistan from ever again becoming a safe haven for terrorists. We found that, to meet this criterion, Afghanistan will need a force similar in size to the ANSF today, but with significant structural and posture adjustments, through at least 2018. This force is not likely to defeat the Taliban militarily, but it could hold against the Taliban insurgency through 2018—and if it did so, the likelihood of a negotiated settlement to the war would increase. This force, as well as the security ministries that support it, will require international enabling assistance—including advisors—through at least 2018, and this assistance mission will need authorities similar to those of the mission in Afghanistan today. Finally, we found that sustained commitment of the international community in Afghanistan would likely mitigate tensions in the region and increase prospects for regional cooperation, but that withdrawal of international support would likely have consequences up to and including a renewed civil war in Afghanistan and increased instability in the region.

North Korean Leadership Dynamics and Decision-Making Under Kim Jong-un

This work examined the leadership dynamics surrounding Kim Jong-un’s first year in power in an attempt to piece together the picture of how decision-making and policy execution work under the new leader. It examined the politics of power consolidation and the centers of power
within the regime. The regime’s red lines regarding policy and its calculus regarding provocation versus engagement were considered, both for what they say about stability within the regime and for any insights that could inform the United States’ North Korea policy.

The Israeli “Nuclear Alert” of 1973: Deterrence and Signaling in Crisis

Nuclear dynamics in the Middle East are of continuing and perhaps growing importance. The U.S. government needs to understand how nuclear-armed countries are likely to “use” those weapons in crisis or conflict. Historical case studies can be highly illuminating about these dynamics. This interest led CNA to a study of one of the Cold War’s most mysterious nuclear moments—the alleged Israeli “nuclear alert” early in the Yom Kippur War of 1973. It has long been rumored that in the desperate first few days of the war, Israel alerted or otherwise manipulated its “special capabilities”—possibly to induce greater U.S. support. To attempt to uncover what really happened and draw appropriate inferences from it, we examined U.S. government archives, surveyed the literature, and interviewed U.S. and Israeli participants and experts. We also hosted a workshop designed to shed as much light as possible on the issue. The result is a CNA study that assesses what happened based on the available evidence and offers key inferences about the nature and role of nuclear weapons in crisis and conflict situations.

Piracy, Illegal Fishing, and Maritime Insecurity in Somalia, Kenya, and Tanzania

Long coastlines, porous borders, a lack of government capacity, weak enforcement mechanisms, corruption, and other factors have enabled illegal, unreported, and unregulated (IUU) fishing to thrive in Somalia’s waters. The same factors have allowed other transnational threats to develop in Somalia—and spread further south into Kenya and Tanzania.

This CNA study, which draws on extensive field research along the East African littoral, identifies and analyzes linkages between piracy and IUU fishing. In addition, the report examines the role of the maritime sector in facilitating the illegal movement of drugs, weapons, and people through the region. This study highlights the role of small vessels in a system that transports terrorists from al-Shabaab, al-Qaeda’s East Africa affiliate, to and from Somalia.
Energy, the environment, and national security

Energy and Climate Security: Two Sides of the Same Coin

The United States and Europe have recently experienced economically devastating and deadly weather events, and have also recognized the strategic and environmental risks from over-reliance on imported oil or gas. The Delegation of the European Union to the United States asked CNA to examine the relationships among energy policies, climate change, and national security within the context of the transatlantic relationship. Last year, CNA held a workshop that convened international experts and policymakers, along with members of CNA’s Military Advisory Board of senior retired military officers, to examine these issues and formulate recommendations for strengthening the community’s collective security. This year CNA built on that conference, publishing a summary of its findings, supplemented by research conducted by CNA and the Royal United Services Institute (RUSI) in London.

Studying the Energy-Water Nexus in China, France, India, and Texas

Thermal cooling in the power sector can account for the largest use of water in developed countries, and is a rapidly growing use of water in the developing world. With support from the ClimateWorks Foundation and our partner, the Regulatory Assistance Project (RAP), CNA researchers developed an energy policy model for the power sector that, unlike most models of this type, addresses water use in power production. The issue is becoming more critical as drought and competition for water resources are limiting power production and hurting energy reliability and economic growth.

We developed scenarios to study the cases of China, France, India, and Texas. In comparing the results of each scenario, we found synergies between conserving water use, reducing conventional air pollutants, and mitigating greenhouse gas emissions (GHGs). Natural gas uses about half the water of coal-fired generation while emitting few conventional pollutants and releasing half the GHGs. Wind and photovoltaics (which turn solar radiation into electricity) use almost no water and have no associated emissions, while energy efficiency measures that
preclude the need for new power generation also eliminate water use and carbon dioxide emissions. We concluded that policies encouraging a move away from coal and the adoption of renewables and energy efficiency showed multiple environmental benefits at modest cost.

**Cumulative Effect of Multiple Encroachments on Navy Training**

During the Navy’s operations and exercises, it relies on the availability of seaspace, airspace, land, and the electromagnetic spectrum. In most cases, the Navy does not have an exclusive right to these resources; therefore, it sometimes must restrict or alter its training and testing activities. This brings up concerns that the combined effect of these restrictions imposes an unacceptable cost to the Navy. To help defend its access to training spaces, the Navy needs a method to assess this cost.

The total cost of restrictions cannot be measured in terms of a single unit, like dollars. Therefore, expert opinion plays a major role in assessing the cost to the Navy of restricting its activities—which we refer to as the cost of incompatible use. Although expert opinions vary, structured procedures to elicit, quantify, and aggregate those opinions can yield useful estimates of the costs of incompatible use. In this project CNA analysts developed a structured, analytically based method for using expert opinions to assess these costs.

**Analyzing the Marine Corps’ Energy Cost Models**

For the Marine Corps, energy efficiency is not only a way to help the environment; it also equates to more effective warfighting. It saves fuel, increases battery life, makes logistics less cumbersome, and increases days of operation without resupply. The Marine Corps Expeditionary Energy Office asked CNA to examine its current life-cycle cost models and see whether they could be improved. By examining case studies, we found out how much the Corps’ use of fuel-saving alternatives is paying off in terms of costs avoided and operations and maintenance dollars saved. We also gave the Marines suggestions on ways to save even more money and further extend warfighting by using new energy technology, such as solar panels and microgrids.

**Analysis to solve domestic problems**

CNA has introduced proven analytic approaches, developed and refined over decades via our work with the military. We have applied those
methodologies to national, state, and local government spheres in emergency management, education, public safety, and air traffic management. What the military has long realized, that operational analysis approaches are extremely successful in addressing difficult challenges, is now being recognized through CNA’s efforts in other government sectors.

Improving education

Helping Teachers Raise Student Performance in Science and Math

Since the 1960s, TERC (formerly, the Technical Education Research Centers) has been improving science and mathematics education. TERC is an independent research organization dedicated to helping all students learn science and math skills. TERC recently created “Using Data,” a professional development program that can help teachers improve instruction through collaboration. In the program, teachers work together to analyze data on student performance, share expertise, try new ideas, and learn from content specialists.

The U.S. Department of Education has funded CNA to evaluate Using Data based on an implementation of the program in Duval County (Jacksonville), Florida. We have collected data on program implementation, teacher behaviors, and student performance on end-of-year math tests. Our results show that many data teams have trouble finding time to meet and sustaining the program’s momentum, but can address both issues by either meeting frequently in short bursts or meeting rarely but for longer periods of time. In terms of student performance, preliminary findings show that the Using Data program may be most effective in working with lower-performing, higher-needs schools.

Helping Students Prepare for College and Careers

Virginia’s Career and Technical Education (CTE) program is helping a half-million middle- and high-school students prepare for jobs in fields where the state needs qualified, certified workers. CNA analysts have been working with the Virginia Department of Education (VDOE) to develop a tool for assessing the state’s CTE programs. Are these programs giving students access to the content, experience, and support they need to be prepared for college and careers.
when they graduate from high school? The tool guides individual CTE program leaders through a self-assessment of their program. We conducted an extensive literature review and interviews with CTE experts in order to determine the most important factors to include. The tool was well received by both the Virginia Superintendent of Public Instruction and the Director of CTE. VDOE had us conduct a workshop with selected directors, to demonstrate the tool and get user feedback to incorporate into final revisions.

Strengthening public safety

Reducing the Number of Police-Involved Shootings

In December 2011, the *Las Vegas Review-Journal* published a five-part series on police-involved shootings by the Las Vegas Metropolitan Police Department (LVMPD) over the past 20 years. Although a number of these shootings involved unarmed subjects and were seen as avoidable, the department’s accountability system and county coroner’s inquest said they were justified and held the officers involved minimally accountable. In response to the public outcry this series produced, the Office of Community Oriented Police Services (COPS) of the U.S. Department of Justice offered assistance through its Critical Response Technical Assistance Program. As the COPS Office’s technical assistance provider, CNA did a groundbreaking study on officer-involved shootings in the Las Vegas area. This study’s goal was to help reduce both the number of such shootings and the number of people killed in these shootings, enhance officer safety, and transform the department’s organization and culture in regard to the use of force. The study’s report, published in fall 2012, gave 41 detailed recommendations.

Over the course of 2013, we have monitored the LVMPD’s implementation of those recommendations. To do this, we have used a multifaceted approach, including direct observations of police operations, interviews, and a detailed review of records (e.g., investigative reports, internal bulletins and memoranda, training videos and lesson plans, training attendance records, evaluation plans, policies, and manuals). Besides monitoring implementation of the recommendations, we have provided technical assistance to help LVMPD carry them out. For instance, we worked closely with LVMPD on reforming its internal administrative review process for officer-involved shootings and other deadly force incidents.

Enhancing Law Enforcement and Research Partnerships Through the Smart Policing Initiative

Police departments across the nation know that the old manpower-driven methods of policing no longer work: citizen demographics are changing, lower budgets are forcing personnel layoffs, and new threats to public safety are emerging. So, they ask, what new strategies should they turn to?
For several years now, we have helped them answer this question through the Bureau of Justice Assistance’s Smart Policing Initiative (SPI).

Through SPI, CNA supports 32 law enforcement agencies in testing new law enforcement tactics and strategies. This year, we helped evaluate such strategies as intelligence-led policing, community policing, social network analysis, and innovative technologies that have reduced crime; and documented best practices. We also supported an SPI study of the importance of partnerships between researchers and law enforcement practitioners. We found that research partners are part of the entire SPI operational process, not just the evaluation aspect; that research partners have positively affected the crime analysis capacity of law enforcement agencies; that widespread recognition exists that research and crime analysis capabilities need to be enhanced; and that these partnerships are valued by both researchers and practitioners.

Enhancing emergency management

Support to the Ardent Sentry 2013 Exercise

What if the United States was hit with simultaneous disasters? Could the nation’s first responders work together in a complex disaster scenario? Every year, U.S. Northern Command holds a nationwide exercise, Ardent Sentry, to test the readiness of
national agencies, as well as state and local responders, to handle increasingly complex emergencies.

In May, CNA analysts supported the control and evaluation of the Department of Health and Human Services’ (HHS) participation in Ardent Sentry 2013. In the exercise, HHS focused on the command-and-control elements required to provide health and medical assistance to Florida in anticipation of two hurricanes making landfall along its East Coast. Our analysts went to exercise locations in Washington, D.C., and Frederick, Maryland, to observe player actions and collect data for an after-action review of the exercise. Following the exercise, we presented our key findings in a quick-look report that highlighted both strengths and areas for improvement.

Exercise and Event Support to the District of Columbia

Throughout fiscal year 2013, CNA provided evaluation and planning support to the District of Columbia Homeland Security and Emergency Management Agency through exercises, drills, real-world event analysis, and planning workshops. A major focus this year was the 57th Presidential Inauguration. We worked with the District and the National Capital Region to conduct two rehearsal-of-concept drills. The first drill, in December 2012, allowed key District agencies to walk through their roles in the inauguration timeline to identify planning gaps and resource needs. The second, “what-if” drill, in January 2013, examined regional responses to potential events during the inauguration, including a scenario involving a mass-casualty event; a major crowd movement, similar to a National Mall evacuation; and the resulting Incident Command System structure and actions. We supported operations during the inauguration and wrote the after-action report for the event. In addition, following the mass shooting at the Washington Navy Yard on Sept. 16, 2013, CNA supported the District of Columbia’s after-action review of its operations and response. The review focused on multiagency coordination and communication.

Improving the safety and efficiency of commercial aviation

Helping Modernize the Federal Notice to Airmen (NOTAM) System

A NOTAM is a notice that alerts aircraft pilots to potential hazards along a flight route or at a certain location. Such hazards can be anything from a local balloon festival, to a tall obstacle (such as a crane) near an airfield, to a flock of birds passing through airspace. The Federal Aviation Administration (FAA) is updating the old analog system of originating and tracking NOTAMs to a new digital system. The new system is easier to use, is less prone to errors, includes maps, and is searchable by key word. The FAA recently reached the goal of the first segment of this effort: to standardize and digitize the collection, storage, and dissemination
The new system now handles over 80 percent of published NOTAMs, and includes a system of applications available to thousands of active users across the United States.

CNA played a significant role in the systems engineering, project management, requirements analysis, and program support of this project. Following the completion of this project, we continued to support the FAA through the NOTAM Improvement Program, under the Pilot’s Bill of Rights legislation. (The legislation dictates that NOTAMs be easily accessible to pilots and use new formatting procedures so that pilots won’t miss important information.) Our efforts will further expand the updated NOTAM system to include a host of new users and ultimately lead to the complete replacement of the legacy NOTAM system.

Which Airports Are the Real Sources of Flight Delays?

The Federal Aviation Administration’s data systems lack metrics on which airports are the sources of flight delays and which merely propagate previous delays. To get at that information, CNA analyzed the movement of every aircraft in the United States. Some of the sources of delays, such as gate availability, are controlled by the airlines and not the FAA. Gate availability depends on airplane type and the need for Customs inspection, and such information is generally not available to the FAA. We were able to identify a source of these data and incorporate them into forecasts of delays.

Another issue in better understanding delays is a conceptual one. Current metrics attribute a delay to the airport at which it occurs, e.g., a flight arriving five minutes late to Atlanta from Chicago, and then departing Atlanta five minutes late, will have five minutes of delay attributed to each of the airports. With our analysis, we attribute all of the delay to Chicago; Atlanta does not add any delay. This methodology allows for a better assessment of how to allocate resources to reduce the aggregate level of delays in the aviation network.
2013 Award Winners

2013 Awards

The CNA Corporation’s Annual Board of Trustees’ Award is presented to the employee who embodies the values of CNA and whose exceptional professional contributions have advanced CNA’s vision and mission.

CNA Corporation’s Phil E. DePoy Award for Analytical Excellence acknowledges sustained analytical excellence or exceptional analytical contribution, coupled with harmonious relations with colleagues and support personnel.

CNA Corporation’s Mary Ann Pianka Award recognizes a sustained record of excellent direct or indirect support of the research effort, coupled with harmonious relations with users and colleagues.
Carey L. Kellam was presented with CNA Corporation's second annual Board of Trustees' Award. Kellam, the manager of the IT Service Desk, was recognized for his outstanding service to CNA and his abilities to get the job done—with great enthusiasm. He also serves as a Chief Warrant Officer in the U.S. Army Reserve. During his 26 years at CNA, Kellam has held increasingly responsible positions, including courier, technician, systems analyst, and user-support team leader. In his current job, he is responsible for providing technical support organization wide. A previous winner of CNA's Mary Ann Pianka Award, Kellam is constantly looking for ways to improve the services his team provides and is known and appreciated throughout CNA for his unfailingly friendly and helpful attitude.

Carla L. Barrett received CNA Corporation's Phil E. DePoy Award for Analytical Excellence. Since joining CNA in 1999, Barrett has progressively built a research program that has had profound impact by identifying and addressing numerous issues associated with systems used for naval and Joint integrated air and missile defense. Following in the tradition of CNA, she deployed to both Operation Enduring Freedom and Operation Iraqi Freedom. She supported U.S. forces in real-time and was a key participant in CNA's after-action reconstruction and analysis of air defense, strike warfare, and combat information systems. In recent years, Barrett has continued her research and has helped set in motion a large engineering program within the Navy to address the interoperability problems she identified.

Miguel Marquez, Jr., was 2013's recipient of the Mary Ann Pianka Award. During his 23 years at CNA Corporation, Marquez has worked in a variety of technology support areas including user support, data administration, security, and audio visual and teleconference support. Over the years, he has supported many CNA events, from small research meetings to large public conferences involving high-level dignitaries and sponsors. Each involves a different set of needs and requires staff with the ability to act quickly under pressure, with sensitivity to the type of guests and audience present. Without fail, Marquez demonstrates the highest level of professionalism, responding to each challenge with creativity and initiative.
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