

# 2010 YEAR IN REVIEW



**CNA**  
ANALYSIS & SOLUTIONS





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For nearly 70 years it has been CNA's mission and privilege to provide objective, empirical research and analysis for our nation's decision makers. Today, in addressing a vast array of national security issues—through CNA's Center for Naval Analyses (a federally funded research and development center)—and in support of departments and agencies across government through CNA's Institute for Public Research, we continue our mission. We give decision makers the information and insight they need to tackle the complex challenges of keeping our country safe and making government programs more efficient and effective.

This Year in Review highlights some of that work, illustrating the breadth of our efforts and the global reach of our undertakings: from CNA analysts working to save lives in Afghanistan; to our continuing, broad-based study of China and how its emergence as a world power affects the United States and other nations; to support of efforts in homeland security, education, and health; to work with the Federal Aviation Administration. You'll also see our special relationship with the U.S. Navy and Marine Corps reflected in this brief overview. CNA's Center for Naval Analyses conducts studies on topics that cover the spectrum of issues related to military effectiveness—from training; to pay and benefits; to combat systems; to reducing the military's dependence on fossil fuels.

Thank you for your interest in our work. My thanks, too, to our sponsors and clients for the confidence and trust they have placed in CNA. And my very special thanks to all the fine women and men of CNA for their dedication, commitment, and hard work on behalf of CNA, our clients, and the American people.

Sincerely,

A handwritten signature in black ink that reads "Robert J. Murray".

Robert J. Murray

# TABLE OF CONTENTS

<b>1</b>	<b>Global Interests</b>
1	Afghanistan
1	Saving Afghan Lives
1	Seasons of Violence
2	Building Relationships While Building Forces
4	China
4	China's International Relations
4	China, Afghanistan, and Pakistan
6	Regional Security
6	The Persistent Piracy Problem
6	From Africa to South America
7	Partnership
8	Iran
8	Iranian Military Culture
8	Social Dynamics
<b>9</b>	<b>Energy &amp; the Environment</b>
9	Powering America's Economy: Energy Innovation at the Crossroads of National Security Challenges
9	The Effect of Climate Change on State and Global Stability
10	Reducing Energy Use on Battlefields and Installations
11	Reduced Fossil Fuel Use, Afloat
11	Whale-Ship Interactions
<b>12</b>	<b>Support to the Federal Aviation Administration</b>
<b>13</b>	<b>Education</b>
13	Community Colleges: A Pathway to Jobs
13	Issues at the State-Level Departments of Education
14	Does the No Child Left Behind Act Affect Student Achievement?
15	Effectiveness of a "Hybrid" Algebra Course in Kentucky
<b>16</b>	<b>Strengthening Health Care</b>
16	Meeting the Needs of the Psychologically Wounded and Those Who Care for Them
16	National Health Care Reform: Good for Military Medicine?
17	Bending the Cost Curve in Navy Medicine
17	Improving Services for Our Veterans
17	Reducing the Burden of Colorectal Cancer

- 
- 18 Cyber Concerns**
    - 18 Strengthening the Navy's Use of Cyber Capabilities
  - 19 Readiness**
    - 19 Manpower Implications of Building and Sustaining the 202K Force
    - 19 Relationship Between Operational Tempo and Retention
    - 19 Advising Service Members on Retirement Choice
    - 20 Quality of Personnel Readiness Measures
    - 21 Crewing Options for USCG Major Cutters
    - 21 Examining Highly Qualified Navy Recruits
    - 22 Shore-Based Infrastructure
    - 23 Slider Scheduler
    - 23 Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance
    - 24 How Many Flight Hours Are Sufficient for Proficiency?
  - 25 Acquisition & Force Structure**
    - 25 Staying Afloat: Analyzing the Navy's Investment Strategy
    - 25 Putting a Carrot in the Contract: Giving Incentives to Contractors (and CEOs) to Control Costs
    - 26 Interoperability Among Navy Platforms
    - 26 Assessing the Joint Non-Lethal Weapons Program
    - 27 Analyses of Alternatives
    - 28 Calculating the Lifetime of Hornets
    - 28 The Navy at a Tipping Point
    - 30 Answering Leadership's Questions about Naval Aviation Force Structure
    - 30 Supporting the U.S. Coast Guard's Analysis of Ship Mixes
  - 31 Military Tactics**
    - 31 Plans to Counter Anti-Access Threats
    - 31 Tactics to Respond to Anti-Access Threats
    - 32 Defense Threat Reduction Agency Fixed-Site Chemical-Biological Requirements
    - 32 Impact of Chemical and Biological Threats on Medical Requirements
    - 33 Antisubmarine Warfare
  - 34 Homeland Security**



# GLOBAL INTERESTS—AFGHANISTAN

## Saving Afghan Lives

As Afghanistan remained center stage in America's global war on terror, many of CNA's most important research efforts of 2010 centered on support of



U.S. military operations in that country. The terms "in theater", "on site", and "on the ground" are hallmarks of CNA's work in support of our military sponsors—especially in their determined efforts to better understand and, ultimately, minimize civilian casualties. CNA's field representative at the Joint Forces Command/Joint Center for Operational Analysis led several studies to develop recommendations for mitigating casualties. These studies were an impetus for reducing civilian casualties in Afghanistan.

CNA's field rep was also the lead analyst in a larger study of civilian casualties—the Joint Civilian Casualty study.

That study resulted in the final report that prompted General David Petraeus to request follow-on work to

identify concrete steps for institutionalization of civilian casualty lessons—a study for which CNA's field representative will again serve as the lead analyst. In conjunction



with these larger studies in 2010, CNA also initiated an analysis of operational procedures and guidelines intended to mitigate casualties and the factors that characterize different types of civilian casualty incidents.

## Seasons of Violence

CNA's research expertise has long provided U.S. military leaders with information that is vital to planning and operations. Because we know violence in Afghanistan tends to peak in the summer and subside during the winter months, CNA's field representative at U.S. Central Command undertook an analysis to determine "seasonally corrected" violence trends, helping to make long-term trends much clearer and allowing for accurate "predictive analyses" of future levels of violence.

# Afghanistan



## Building Relationships While Building Forces

A great deal of CNA's work on Afghanistan-related issues in 2010 focused on security and peacekeeping within the country. CNA's field representative with 2nd Marine Expeditionary Brigade (Forward) in Afghanistan provided analytic support to the Marines and Helmand Provincial Reconstruction Team on issues associated with governance and the rule of law. That analyst also supported an initiative to engage with the local religious leaders in an effort to reduce local support for the insurgency and helped develop a comprehensive strategy to engage religious networks.

CNA analysts also authored two books on Afghanistan in 2010: "Counterinsurgency on the Ground in Afghanistan," which provides a glimpse into what relatively small military units (teams, platoons, companies, and highly dispersed battalions) have done to roll back the insurgency in some of the more remote areas of Afghanistan; and "Police Mentoring in Afghanistan 2007–2009," which examines the experiences of individual American and British soldiers and Marines who served as mentors in Afghanistan.

### Excerpt From: "POLICE MENTORING IN AFGHANISTAN 2007-2009"

"As shown throughout the vignettes, soldiers and Marines were faced with police units riddled with corruption, drug use, incompetence, and poor leadership. Recruits, drawn from the lowest rungs of village life, were hobbled by illiteracy and, in some cases, physical and mental shortcomings. Senior police leaders routinely robbed their men of their pay and equipment.

"Preyed on by their superiors, policemen in turn preyed on the populations they were meant to protect and serve. In many districts, the [Afghan National Police's (ANP)] predatory behavior turned the public against the police and cut off the flow of information from the population that is essential for effective counterinsurgency. Police abuses also served as a major recruiting tool for the Taliban. Alienated from the public, poorly led and motivated, and often thrust into combat conditions, the ANP were easy and ripe targets for the insurgents."

(<http://www.cna.org/research/2010/police-mentoring-afghanistan-2007-2009>)



Excerpt From: "COUNTERINSURGENCY ON THE GROUND IN AFGHANISTAN"

"Afghanistan...is a pre-modern society with an extremely dispersed, almost entirely rural population. The insurgents are based in the villages and have little support in the cities. Many Afghans have never left their villages and have almost no knowledge of the outside world. To many, the Kabul government is like a foreign entity. In order to influence a population that is so spread out, troops must disperse across vast distances and operate from isolated bases. They must deal with conservative rural communities, most of them illiterate, for whom national identity and public service are unfamiliar concepts. Islam, tradition, and ties of blood are far more important."

"Afghanistan's population is extremely fragmented. The politics of each village, town, and valley are a hornet's nest of small tribes and clans fighting constantly over land, water, and other resources. These conflicts have little connection to larger political dynamics, or even to those of adjacent areas. The Pashtun tribes of Afghanistan have long been a fractured and quarrelsome lot, fiercely protective of their autonomy, suspicious of outsiders, and distrustful of nearly all forms of authority..."

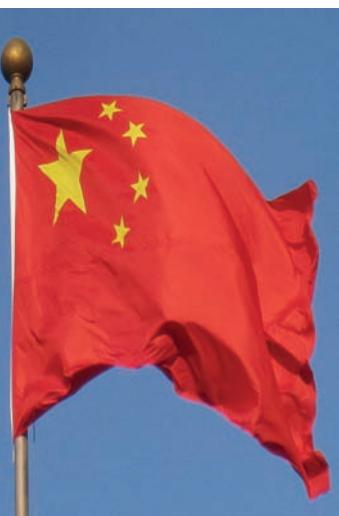
"Decades of insurgency and civil war have destroyed much of the traditional leadership leaving the Pashtuns more divided and fractious than ever. In this environment, it is hard to forge consensus, to find leaders to work with who have real power, and to form alliances without earning the enmity of rival factions. For coalition forces, the political fault lines are not clear, and there is constant danger of getting drawn into local feuds. Decades of war have also destroyed what little government once existed in Afghanistan, leaving coalition troops to build institutions from scratch." (<http://www.cna.org/research/2010/counterinsurgency-ground-afghanistan>)

# GLOBAL INTERESTS—CHINA

## China's International Relations

CNA is dedicated to providing its sponsors and the public with the best possible analyses of China's emerging role in the world, important issues in U.S.-China relations,

We also hosted two important roundtables of experts in 2010 that yielded reports providing perspectives and insights on China's interests in South Asia and South-



and critical developments within China itself. It draws upon the expertise of analysts, including those who have lived, worked, or studied in Greater China and who speak and read Mandarin. Their non-partisan, empirically based research provides the insights and context leaders need to develop sound plans and policies and to make informed judgments about China. Throughout 2010, our specialists produced papers, briefings, monographs, and book-length studies exploring a wide range of issues focused on Beijing's foreign policies, Chinese views of various developments in international security affairs, and some of Beijing's more important bilateral relationships.

China's evolving relationships with other nations have an important bearing on U.S. interests. In 2010, CNA brought attention to the complexities in Sino-Russian relations and their implications for the United States with the edited volume "The Future of China-Russia Relations" (University Press of Kentucky, 2010, 360 pp.).

west Asia. "A Closer Look at China-Iran Relations" (<http://www.cna.org/research/2010/closer-look-china-iran-relations>) summarizes the discussions of academics and analysts on China's relations with and activities in Iran. "Exploring the China-India Relationship" reports the current state of the 60-year diplomatic relationship between those two nations. (<http://www.cna.org/research/2010/exploring-china-india-relationship>)

## China, Afghanistan, and Pakistan

In "U.S. Strategy in Afghanistan-Pakistan: Chinese Views and Interests," CNA analysts looked into Beijing's evolving views of the United States' approaches to Afghanistan and Pakistan, highlighted Chinese concerns, identified areas of common interests, and assessed the prospects for cooperation. (<http://www.cna.org/research/2010/us-strategy-afghanistan-pakistan-chinese-views>)

# China



## Excerpt From: "U.S. STRATEGY IN AFGHANISTAN-PAKISTAN: CHINESE VIEWS AND INTERESTS"

"China shares key anti-terror and stability objectives with the U.S./NATO coalition in both Afghanistan and Pakistan, largely because of China's concerns about the implications for instability in its Muslim Xinjiang province, which borders both countries. But apart from these shared concerns, Beijing's history with Pakistan has differed markedly from its history with Afghanistan. For the most part, Beijing has pursued separate bilateral relationships with each country (as is its foreign policy preference), without linking the two into a more comprehensive regional context, as the United States has now done. Chinese interests in the two countries differ in fundamental ways from the interests on which the new U.S. strategy on Afghanistan-Pakistan is based, and they affect China's response to the new U.S. strategy accordingly."

"China has long enjoyed a special economic, political, and military relationship with Pakistan. The two countries maintain robust official exchanges at all levels, conduct combined military and anti-terror exercises, and hold regular security and economic dialogues. Beijing's relations with Islamabad have an especially strong and deep security and military-to-military component, based to a great extent on shared mutual security concerns about India. Therefore, the new U.S. strategy on Afghanistan-Pakistan, which bolsters U.S.-Pakistan military relations and economic ties, and which links Pakistan's future 'inextricably' with Afghanistan's, has significant implications for the framework of China-Pakistan military-to-military relations."

# GLOBAL INTERESTS—REGIONAL SECURITY



## The Persistent Piracy Problem

Naval Forces Africa (NAVAF) asked CNA to examine current and potential whole-of-government and international solutions to the piracy problem. Our analysts delved into how piracy affects the U.S. Navy and the importance of building a coalition of cooperation with countries such as China and India. We analyzed piracy incidents off the west and east coasts of Africa and created an analytic model of the “pirate business enterprise” in Somalia and the Gulf of Guinea. We published research on the international legal framework for counterpiracy and used the results of these analyses to develop a framework for a whole-of-government approach to the counterpiracy problem. In addition, we addressed the issues of piracy and coalition building in our report, “Growing Chinese and India Naval Power: U.S. Recalibration and Coalition Building.” (<http://www.cna.org/research/2010/growing-chinese-indian-naval-power-us>)



## From Africa to South America

CNA analysts provided research support to Defense Sector Reform efforts in Africa that included conducting a case study of the reform process in Liberia. Their efforts, however, were not limited to the African continent. The analysts created a framework that could be used for other states and worked on key issues relating to security in South and Central America. CNA also supported efforts to compose a comprehensive Department of Defense strategy for Central America and studied the impact of climate change as it relates to security issues across South America, the results of which are in the report, “Security Planning and Policies to Meet the Challenges of Climate Change.” (<http://www.cna.org/research/2010/security-planning-policies-meet-challenges-climate>)

### Excerpt From: “SECURITY PLANNING AND POLICIES TO MEET THE CHALLENGES OF CLIMATE CHANGE”

“Across South America, climate projections indicate that temperatures will continue to rise gradually, by approximately 2°C to 4°C on average by 2040 (assuming no significant change in global emissions trends). Differences in latitude, local geography, and prevalent wind and weather patterns will significantly affect actual temperatures at the local level. Projections indicate, however, that the highest temperature rises are likely to occur in the Amazonian region of north Brazil, Guyana, and Venezuela, and the savannahs of east Colombia and southwest Venezuela. Heat waves are expected to become increasingly common, especially in the southeastern area of the continent.”

# naval



## Partnership

In 2010, Naval Forces-Africa refocused its mission on specific threats to U.S. national security. CNA continued to support the command by analyzing its Africa Partnership Station operations. The goal was to look at the West African countries that participate in the partnership. Were they achieving a secure maritime environment in light of specific threats? Using on-scene data collection from missions and intelligence information, we found the host nation maritime forces had increased interest in improving maritime security, but we also found fundamental barriers to their forces providing security. In our final report we identified potential ways to improve effectiveness of future Africa Partnership Station missions.

On the subject of maritime security, the Assessment Division of the Office of the Chief of Naval Operations (OPNAV N81) asked CNA to help establish consistent approaches to measuring the effects of costly large-scale deployments that include supporting missions such as the U.S. Pacific Command's Pacific Partnership, the U.S. Southern Command's Continued Promise, and the U.S. Africa Command's Africa Partnership Station. The objective was to come up with an analytically rigorous approach to resourcing these engagement missions. We documented the approach used

by the Navy component commanders in each theater. We identified how these commanders define and assess operational objectives and showed that failure to be specific about mission objectives and the relationship between specific mission activities and mission objectives resulted in an inability to measure progress toward objectives in some theaters. Our analysis resulted in recommendations for methods the component commanders could use to assess these operations and the resources they will need to improve sea-shaping assessments.

In January 2010, our analysts completed an assessment of the effectiveness of U.S. Navy shaping activities, specifically message shaping. The innovative project provides recommendations on gauging the effectiveness of shaping efforts toward certain countries in the region. What are the messages other countries are receiving from U.S. Navy activities, both intentional and unintentional? Over the course of this project, our analysts created a unique database to track shaping messages reaching a specific target audience.

# GLOBAL INTERESTS—IRAN

## Iranian Military Culture

Iran's influence and actions, internally and throughout the Middle East, make it an extremely important player in world affairs. Yet, the opaque nature of the regime in Tehran, together with linguistic, cultural, and political barriers to interaction, make it difficult to gain insight and understanding on Iran, its people, and its government. CNA's experts on Iranian political, social, economic, and military affairs overcome these barriers and produce cutting-edge, non-partisan research on Iran.

CNA analysts conducted a groundbreaking study on Iranian military culture, looking at the life of the common soldier in the two main branches of Iran's armed forces—the Iranian Revolutionary Guard Corps and the Artesh. The analysts based their study on a wide variety of English and Persian language primary-source materials and interviews with enlisted soldiers and officers. They explored recruiting, demographics, training, career progression, ideological indoctrination, and civil-military relations. CNA experts also contributed the chapter, "Iran's Military Doctrine," to the book, "The Iran Primer," published by the United States Institute of Peace. (<http://iranprimer.usip.org/resource/irans-military-doctrine>)

## Social Dynamics

CNA's Iran-related research goes beyond security issues. In the study "Investigating the Dynamics of Power and Society in Iran's Eastern Provinces", CNA's analysts looked at the internal dynamics of Iranian society at



the provincial level. Using an analytic framework that incorporated elements of cultural anthropology, history, political economy, and institutional and social network analyses, they were able to map the social, economic, and political contours of Iran's eastern provinces. This interdisciplinary approach allowed the analysts to paint a detailed picture of inter-communal dynamics, how government functions at the local level in Iran, and the issues that affect center-periphery relations.

### Excerpt From: "THE IRAN PRIMER"

"The basis of Iranian military doctrine was developed during Iran's long and traumatic war with Iraq (1980–1988). Most senior officers are veterans of the "imposed war," which has had a major influence on Iranian strategic thinking. Concepts such as self-reliance, 'holy defense,' and export of the revolution first entered the military lexicon during the Iran-Iraq War and were codified as doctrine in the early 1990s. These ideas mingled with concepts from pre-revolutionary doctrine, which was heavily influenced by the United States, to form a unique hybrid that distinguished modern Iranian military doctrine from its largely Soviet-inspired counterparts in the Arab world."

"After the war, Tehran gradually scaled back its efforts to export its revolution. As its foreign policy goals shifted, Iran's national security strategy also became more defensive. Iranian military strategists began to pay more attention to the principles of modern maneuver warfare, such as combined and joint operations. In the mid-1990s, there was even talk about merging the IRGC with the regular military, the Artesh, to alleviate the command and control-related problems of having two parallel military services operating in tandem. Iran's military capabilities still lagged behind its doctrine, but by the end of the decade, its forces were gradually evolving into professional, Western-style militaries."

# ENERGY AND THE ENVIRONMENT

## Powering America's Economy: Energy Innovation at the Crossroads of National Security Challenges

CNA completed this study in 2010, informed by a Military Advisory Board (MAB) consisting of a panel of recently

retired three- and four-star military officers from all services. We explored the growing challenges presented by the links that tie the nation's current energy posture to its economy and national power. We addressed the benefits of the transition to a clean-energy economy and the key role the Department of Defense (DoD), in alignment with the Department of Energy, can play to support innovation and commercialization of clean energy, all of which could directly contribute to America's future economic competitiveness and bolster national security. We found that, in the course of addressing its most serious energy challenges, the DoD could contribute to national solutions as a technological innovator, early adopter, and testbed.



The study team and advisory panel recommended that DoD collaborate with private-sector innovators and establish an Operational Energy Innovation Center. We further recommended that DoD require widespread sharing of energy information in its research-and-development enterprise and that the agency prioritize

"Powering America's Economy" at a conference hosted by the White House, July 27, 2010, featuring keynote addresses by the Secretary of the Navy and the Deputy Secretary of Energy. Some of the study's recommendations were reflected in a Memorandum of Understanding between the Department of Defense and the Department of Energy announced that day. (<http://www.cna.org/reports/economy>)

## The Effect of Climate Change on State and Global Stability

Several studies in recent years have pointed to the national security implications of global climate change. The National Intelligence Council (NIC) concluded that climate change will affect all nations and, in some cases, could affect state stability in ways that have implications for U.S. security interests. The NIC laid out a set of future research needs to help inform U.S. policy with respect to climate change and national security.

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planning. It seeks to identify countries that current research suggests are both highly exposed to various effects of climate change and are unlikely to show resilience in response. To support these research needs, the NIC asked CNA to examine countries that could become unstable from climate change in the near (2020–2025) and long (2040–2045) terms. We compiled a list of countries most vulnerable to political or humanitarian crises as a result of the effects of climate change. We determined that the greatest likelihood of crises is found in north and central South America and South Asia, with the Andean countries of South America increasingly threatened over the long term due to glacial loss. Under foundation tasking, we also examined the future of climate-change-induced migration, and published a report titled, *Climate Change, Migration, and Emergencies: In Search of a Policy Framework*. (<http://www.cna.org/research/2010/climate-change-migration-emergencies-search-policy>)

## Reducing Energy Use on Battlefields and Installations

The February 2008 Report of the Defense Science Board Task Force on DoD Energy Strategy concluded that DoD faces two primary energy challenges: (1) unnecessarily high, and growing, battlespace fuel demands, which compromise operations and can jeopardize missions; and (2) critical missions at military installations being vulnerable to loss from commercial power outages and inadequate backup power supply. In work for the Deputy Chief of Naval Operations, Logistics, we helped the Navy develop an energy strategy that addresses operational demand for fuel and energy use at installations. That strategy provided policy options on how to maintain operational effectiveness while finding opportunities for more effective and efficient use of energy resources and yet minimize impacts on climate. Regarding operational (fleet) use, we recommended that the Navy change policies and doctrine to allow more fuel-efficient training and incorporate the fully burdened cost of fuel in all acquisition and force-structure decisions. For installation use, we recommended an energy goal of a net grid-neutral Department of the

# ENERGY AND THE ENVIRONMENT

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Navy by 2024. We proposed that the Under Secretary of the Navy be designated the Department's Energy Executive, responsible for promulgating and implementing the Navy's energy strategy.

## Reduced Fossil Fuel Use, Afloat

The Assessment Division of the Office of the Chief of Naval Operations asked CNA to assess the prospects for a 15-percent reduction in fossil fuel use by 2020 for afloat forces. We focused on current force structure, plus already planned additions to that force, such as the 30-year shipbuilding plan and the Naval Aviation Plan 2030. We determined the baseline fuel use in 2008; estimated how much fossil fuel would be used each year between 2008 and 2020; characterized the currently planned Navy programs; assessed doctrinal, procedural, and tactical changes that have potential to reduce fossil fuel use by afloat forces; and estimated the effects of current plans to reduce fossil fuel use as a function of time. We found significant fuel savings are being achieved with current initiatives and additional initiatives need to be considered to get the Navy to the 15-percent goal.

## Whale-Ship Interactions

CNA developed an entirely new approach for modeling ship-mammal interactions in support of Navy compliance with the requirements of the Marine Mammal Protection Act and the Endangered Species Act. We built on our previous experience in the development of agent-based models and developed a simulation tool that models marine mammals as "agents" that follow prescribed behavioral tendencies. This tool allows scientists and decision makers to explore the implications of varying assumptions about whale behavior and the potential effects of Navy operations on marine mammal populations. Both Navy environmental staffs and a senior representative of the National Oceanic and Atmospheric Administration (NOAA) have called this model revolutionary.

# SUPPORT TO THE FEDERAL AVIATION ADMINISTRATION



History was made in 2010 when Atlantic City International Airport (ACY) became the first airport in the world to issue a completely digital Notice to Airmen (NOTAM), which alerts air traffic controllers and pilots of temporary changes to, or hazards in, the National Airspace System (NAS). The Federal NOTAM System (FNS) is being modernized to improve the digital capture, management, and distribution of NOTAM information to the NAS. The FNS prototype first demonstrated in ACY has shown that NOTAMs can be published in a few seconds as opposed to as much as 20 minutes, possibly saving lives. CNA analysts performed the technical, policy, and requirements analysis necessary to enable this digital capture of the NOTAM information for airport operations. Our analysts continue to assist the Federal Aviation Administration (FAA) in modernizing the NOTAM system.

Our support to the FAA also includes measuring and reporting the health of its equipment. The Technical



Operations business unit of the FAA acquires and maintains the equipment infrastructure of the National Airspace System, such as radars, navigation aids, communications and information technology, and related services. Managers coordinate with air traffic managers to guide traffic around inclement weather and equipment outages. To aid in the daily coordination, the managers would like to have a dynamic display of the status of equipment as well as air traffic. For planning purposes, they would like to assess the effect of unscheduled outages on the flow of aircraft through the system. CNA developed a Facility Equipment Health Index and a risk-of-equipment-failure model as performance metrics to guide Technical Operations managers. We used historical equipment-failure data to estimate a hazard-rate model that would apply across all types of equipment and are helping develop a prototype Equipment Status System to deliver this kind of geospatial information. CNA continues to work with the FAA on the analysis and development of this system.

# EDUCATION

## Community Colleges: A Pathway to Jobs

Over the past generation, the earnings gap between high school and college graduates has grown considerably. Many policy-makers take this growing gap as an indication that



some post-secondary education is a near requirement for access to the good jobs in the 21st century. With support from the Gates Foundation, CNA has investigated pathways from high school through post-secondary institutions and into the workforce. Using a database from Florida that combines records from high school, post-secondary education, and the unemployment system, we studied the cohort of students entering 9th grade in 1996 and found that only 19 percent of the entire cohort received any post-secondary credential. We also found that, on average, students earning a certificate in occupation-oriented areas, such as health care, have higher earnings than students earning associate degrees in academic subjects such as the humanities. This means earning a certificate may be a better pathway for some students in community colleges than earning a degree. We conducted this work for the National Assessment of Career and Technical Education to investigate differences in pathways across urban, suburban, and rural locations.

## Issues at the State-Level Departments of Education

CNA Education continues to expand its work with research funded by the federal government, foundations, and other education organizations. Our most significant

undertaking is the management of the Regional Educational Laboratory Appalachia (REL), one of ten applied research and analysis centers funded by the U.S. Department of Education's Institute of Education Sciences. Nearing the end of the fifth year of this contract, we have produced a range of studies and analyses on important education topics for Kentucky, Tennessee, Virginia, and West Virginia. One of the hallmarks of our approach to addressing applied education research needs is the placement of embedded analysts in each of the four states. Located in the state departments of education, our analysts are an important component of the REL's efforts to build state and local capacity. For example, our analyst in Kentucky has supported improvements to career and technical education (CTE) programs through analysis focused on the examination of associations between ACT and Kentucky Occupational Skill Standards Assessments scores. Our analyst in Tennessee, with support from researchers on-site at CNA, has been supporting efforts to turn around low-performing schools, examining these

# Educa



schools' performance in relationship to other schools in the state and supporting state school improvement planning. Our analyst in Virginia is assisting in the identification of data requirements and analysis techniques that will increase understanding of issues associated with credentialing deaf interpreters. And in West Virginia, our analyst is supporting the West Virginia Department of Education Innovation Zones initiative. Throughout the region, the work of our analysts has increased demand for research and analysis and helped build capacity to understand and utilize data in decision-making at state, district, and school levels.

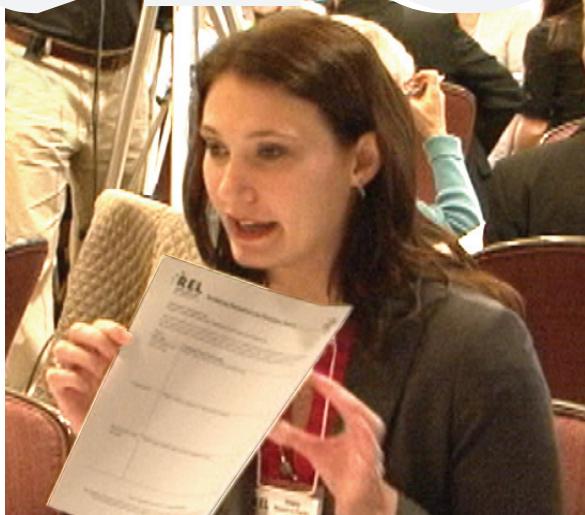
## Does the No Child Left Behind Act Affect Student Achievement?

Analysis of student achievement data in Kentucky and Virginia finds that schools with the greatest increases in the percentage of students passing state assessments also had the greatest increases in the percentage of students testing advanced. The No Child Left Behind Act of 2001 requires all states to test students in key subjects and assess whether they are below proficient, proficient, or advanced, but educators and others have expressed concerns that focusing on moving students from below proficient to proficient could result in fewer gains for students who are already

### WHAT IS REL APPALACHIA?

"The Regional Educational Laboratory (REL) Appalachia serves the applied education research needs of Kentucky, Tennessee, Virginia, and West Virginia. Our mission is to conduct empirical research and bring evidence-based information to policy-makers and educators as they strive to improve education practice. Our work addresses high-priority topics including standards, curriculum and assessment, teacher effectiveness, data collection and use, and school performance. REL Appalachia is part of a system of 10 research laboratories funded by the US Department of Education's Institute of Education Sciences, which supports efforts to improve public education at the state, local, and school level." (<http://www.cna.org/centers/education/rel>)

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proficient or advanced. CNA's Regional Educational Laboratory Appalachia addressed this concern using data from Kentucky and Virginia schools to analyze how the percent of students passing and scoring advanced has changed since 2002 and whether there is a link between the two. We found that schools showing significant increases in percent passing did not show decreases in percent advanced.

### Effectiveness of a "Hybrid" Algebra Course in Kentucky

As part of CNA's Regional Educational Laboratory Appalachia, we have been leading a random control trial of a hybrid algebra course developed by the Kentucky Virtual

High School. The hybrid approach combines a traditional classroom format with online curricula for students and professional development for teachers. The professional development also includes access to a master teacher through online chats. We are implementing the trial in about 40, mostly rural, middle schools. This complex research project is in its fourth year. We have completed the data collection, drafted our analysis plan, had that plan approved by the Department of Education's Institute of Education Sciences (IES), and drafted the effectiveness report. That report is now in the IES approval process.

#### Excerpt From: "CHANGES IN THE COST OF ENERGY IN ONE STATE'S SCHOOL DISTRICTS"

"Energy prices have received considerable public attention in recent years, especially the run-up in crude oil prices to \$140 a barrel in summer 2008. But the prices of other forms of energy, such as electricity and natural gas, have also risen dramatically. These price increases have affected energy expenditures by local education agencies. Facing unexpected increases in energy bills for which no budget allowance had been made, school districts have considered such drastic actions as reducing the school week to four days. Yet, despite the substantial public attention to the implications of rising energy prices for school districts, little research has examined the issue." ([http://ies.ed.gov/ncee/edlabs/regions/appalachia/pdf/REL\\_2010088.pdf](http://ies.ed.gov/ncee/edlabs/regions/appalachia/pdf/REL_2010088.pdf))

# STRENGTHENING HEALTH CARE



## Meeting the Needs of the Psychologically Wounded and Those Who Care for Them

More than the physically injured return from Operation Enduring Freedom and Operation Iraqi Freedom. The care for those suffering psychological wounds is a major commitment for the military. At CNA, we're working with the Office of the Assistant Secretary of Defense for Health Affairs to develop models for ideal staffing requirements to meet the needs of service members and their families. Thus, we delivered Version 2.2 of the Psychological Health Risk Adjusted Model for Staffing. This model forecasts the medical staffing needs and requirements—both operational requirements and the needs for Military Treatment Facilities—for every type of psychological health provider, from psychiatrists to social workers.

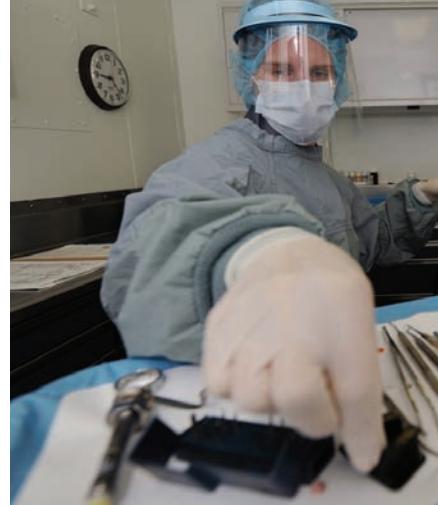
Then there are the caregivers themselves. The ongoing battlefronts and repeated deployments of Navy Medicine personnel raise concerns that they, too, will experience high levels of occupational stress. These individuals tend not to take the time to assess and maintain their own psychological health. CNA studied these individuals and delivered the "Caregiver Occupational Stress Assessment," which works as a barometer for caregivers to recognize

signs of stress in themselves. Good leadership and access to resources for work-related strains can also help to decrease stress and feelings of burnout.

## National Health Care Reform: Good for Military Medicine?

National health care reform, including ways to control costs, could have important implications for military medicine. Working with the TRICARE Management Authority, CNA identified and analyzed three issues. First, we looked at individual mandates. In 2006, Massachusetts required residents to buy health insurance. To see how this would affect TRICARE, we compared Massachusetts to the other five New England states. We found no meaningful differences in the cost per member but did see a shift in behavior toward a greater reliance on TRICARE by both enrollees and nonenrollees. When we expanded those results across the system, we estimated the cost to TRICARE at \$75 million per year. Second, we looked at patient-centered medical homes, which were one part of the health care reform debate. At the same time, the Department of Defense decided to start using medical homes across its system. We examined the data and found only small changes in both direct and private-sector care costs and workload after the first year. However, not all of the changes were favorable, and it will take more than a year

# Care



to determine the effects of this transition. Our third issue was Medicare. Our analysis showed the more it limited payments the more those costs were shifted to TRICARE.

## Bending the Cost Curve in Navy Medicine

Because Navy Military Treatment Facilities can be found across the globe, from Maine to Bahrain, there are also variations in the delivery of health care services just as there are in any health care system. In an effort to "bend the cost curve," CNA continues to look at the facilities, their geographic areas, demographics, and mix of medical cases. In 2010, we focused our analyses on two expensive, high-volume procedures: admission rates to neonatal intensive-care units and the rate of hysterectomy surgery. In all cases, we found important unexplained differences in the care delivered to these different populations. To the degree that Navy Medicine can reduce unwarranted variation in health care delivery through evidenced-based care, it will improve quality, increase efficiencies and consistency, and lower health care costs.

## Improving Services for Our Veterans

CNA completed an evaluation of a Department of Veterans Affairs (VA) pilot program to speed up the processing of "fully developed claims." By allowing veterans to self-

designate their disability claim as fully developed, it gives the VA all the information it needs. In this way, our study found, claims were processed 64 days faster.

## Reducing the Burden of Colorectal Cancer

In a project for the Centers for Disease Control and Prevention, we evaluated a six-step intervention for improving the rate of screening for colorectal cancer and the rates of follow-up services for positive screens. This intervention is known as the System Approach to Tracking and Increasing Screening for Population Health Improvement of Colorectal Cancer (SATIS-PHI/CRC). The intervention tries to influence the behavior of both primary-care providers and their patients through targeted communications and improved identification and tracking of both the screening and the follow-up processes. We found the program was marginally successful but had hindering factors like shortcomings in electronic medical records systems for use in these types of programs and shortages of colonoscopy providers to meet an increase in demand for screening. Despite these shortcomings, we found more patients are getting screened and more providers are being educated about the intervention. We also developed a toolkit to allow other health systems to use the intervention in their practices.

# CYBER CONCERN



## Strengthening the Navy's Use of Cyber Capabilities

At CNA, and in locations where some of our field representatives are deployed, we've analyzed numerous issues involving information technology and cyber strategies. In June 2010, we finished analyzing options for increasing data throughput using acceleration methods. We tested the acceleration feature of PacketShaper aboard USS *Dwight D Eisenhower* while the ship was deployed. The feature is now considered an "operational requirement" and will soon find its way aboard aircraft carriers and large-deck amphibious ships.

At the Fleet Cyber Command/Tenth Fleet, our CNA field representative also completed a lessons learned project analyzing the Cyber Strategic Partnership Cell, a "think tank" made up of industry, interagency, and federally funded research and development center partners. The cell provided new ideas on response options to the cyber threat during the exercise, and the command is interested in formalizing this concept.

CNA studied various GPS modernization options with respect to improved availability and autonomy of GPS,

as well as potential anti-jam capabilities. We provided the results to the Office of the Assistant Secretary of Defense for Networks and Information Integration, which led to a request for an analysis of alternatives on Position, Navigation and Timing Assurance systems.

We also helped the Navy's new Tenth Fleet/Fleet Cyber Command strengthen operational cyber support to Navy forces worldwide and analyzed how dependent Carrier Strike Group operations are on the unclassified military network and what would happen to operations if the network is disrupted or lost.

In March 2010, the Federal Communications Commission delivered its National Broadband Plan to Congress, proposing to provide more RF spectrum available for broadband use. Our analysts conducted an inventory of the Navy's RF spectrum usage and developed a strategy for addressing demands for reallocation of frequency bands currently in use. The strategy addresses the potential effects of changing technology on future Navy/Marine Corps RF spectrum allocations.

# READINESS

## Manpower Implications of Building and Sustaining the 202K Force

The Marine Corps achieved an active-component endstrength of 202,000 (202K) Marines in FY 2009—

the Post-9/11 GI Bill will encourage Marines to leave in greater numbers, and that there could be other, unknown



growth that originally had been scheduled for completion by the end of FY 2011, which gave us the opportunity to assess the manpower implications of accelerated force growth. In a study for the Assistant Commandant of the Marine Corps, we addressed such issues as: whether force quality suffered during the 202K build; the effectiveness of compensation used to grow the force; how the rapid growth affected the experience levels of enlisted Marines and officers in the Corps; and whether the 202K force currently on board matches the 202K force the Marine Corps wanted to have.

### Relationship Between Operational Tempo and Retention

This study continues the work begun previously that examined the relationship between operational tempo (OPTEMPO) and continuation rates since 9/11. When the study began, there was grave concern that increased OPTEMPO would adversely affect continuation rates. Although the Marine Corps exceeded its increased end-strength goals, we continue to monitor the relationship between OPTEMPO and retention and specific issues that might prove to be problems in the future. For example, there are concerns that the shift in emphasis from Iraq to Afghanistan might adversely affect retention rates, that

factors that could hurt the continuation of the enlisted and officer force. Our work includes a combination of econometric data analysis and focus-group analysis. We conducted several focus groups at III MEF and briefed our findings to the deputy commandant for Manpower and Reserve Affairs, Headquarters Marine Corps.

### Advising Service Members on Retirement Choice

The May 21 House Armed Services Committee report on the FY 2011 Defense Authorization Act mentions the committee's concern that service members are not being provided appropriate counseling and information before they decline or accept the \$30,000 career retention bonus upon reaching 15 years of service. Furthermore, it encourages the Secretary of Defense to initiate an education program to improve the counseling and information provided to service members before they make a decision about the career retention bonus. The report cites CNA's work on this issue, saying that, "The committee understands that the Center for Naval Analysis [sic] has devoted considerable research into this matter and would be positioned to provide valuable information on what can be done to ensure that service members receive the information necessary to make well-informed decisions about the career retention bonus."

# Ready



We first examined this issue in 2000 and have updated this work each year. We found that most service members lose more than \$300,000 in retirement monies if they take the \$30,000 bonus at 15 years of service. We continue to brief (and distribute) this work in a variety of venues, including the Commanders' Program, the Sergeant Major's Symposium, and the Senior Enlisted Seminars. We also work with the Marine Corps on its annual memorandum on the subject and provide access to a web-based retirement choice calculator on our corporate website at <http://www.cna.org/centers/resource-analysis/retirement-calculator>. Read the entire "Retirement Choice: 2010" report at <http://www.cna.org/sites/default/files/news/2010/D0022180.A1.pdf>.

## Quality of Personnel Readiness Measures

The Navy operates two systems that provide measures of how well Fleet units are manned. The Manpower, Personnel, Training and Education Enterprise calculates and reports personnel Fit for Fleet units (i.e., a measure of the percentage of manpower requirements that are met by the crew). United States Fleet Forces Command operates the Defense Readiness Reporting System-Navy (DRRS-N), which calculates and reports the ability of Fleet units to conduct their missions. The DRRS-N calculations include measures of Fleet unit manning, different than the Fit measures. CNA investigated whether the two systems produce inconsistent measures of Fleet manning, and whether the DRRS-N personnel manning measures could

### Excerpt From: "RETIREMENT CHOICE: 2010"

"Bonus-takers will get some of their retirement income early, at the 15-year-of-service point. Consider REDUX's \$30,000 bonus as an early cash-out of part of a servicemember's retirement pension. We can calculate how much this cash-out costs the member by thinking of it as a 'loan' to be paid back later in the form of lower retirement checks.

"This so-called loan, given at 15 years of service, is paid back over the servicemember's entire retired lifetime. Most people are familiar with car loans, mortgages, and credit card debt. Car loans and mortgages have fixed loan periods, often 5 years for cars and 30 years for mortgages. Credit card debt is a little different, requiring only a minimum payment per month. We characterize all these loans by the interest rates and interest payments attached to them."

# ness



be used to prioritize assignments, leading to improvements in operational Fleet readiness. Our analysis showed some significant differences between the two methods of calculating personnel readiness with regard to detailed enlisted skills, i.e., Navy Enlisted Classifications (NECs). We also identified some flaws in DRRS-N calculations, which inhibit the ability to relate personnel manning measures to the capability of Fleet units to conduct their missions: hence, the Navy is unable to prioritize assignments in order to maximize operational readiness. At the end of 2010, the Navy was considering how to proceed.

### Crewing Options for USCG Major Cutters

In a study for the U.S. Coast Guard, we examined options for increasing the operational tempo of its major cutters.

We assessed equal-capability force mixes of medium cutters with legacy crewing, rotational crewing, and increased personnel tempo. We found that crew rotation and increased personnel tempo can provide the same scheduled patrol time at 3- to 10-percent less total cost (both acquisition and operations). However, both introduce substantial operational risk as well as less surge capability and less schedule flexibility than legacy crewing.

### Examining Highly Qualified Navy Recruits

The recession allowed the Navy to increase the quality of its recruits and it became timely to study highly qualified Navy enlisted applicants and accessions—those qualified for the most technical and specialized Navy ratings.

#### Excerpt From: "POPULATION REPRESENTATION IN THE MILITARY SERVICES: FISCAL YEAR 2009 REPORT"

"The Obama administration's comprehensive Afghanistan strategy review that summer and fall resulted in a decision to deploy 30,000 more troops. By the end of the FY, troop levels in Afghanistan were approaching those in Iraq, where U.S. military presence was drawing down from a 2007 peak of 172,000 troops. U.S. troop levels in the Afghanistan and Iraq theaters together averaged 186,000 soldiers, sailors, airmen, and marines over the course of the year. These troops were deployed from an FY 2009 endstrength base of 1.4 million active-duty troops and 850,000 reservists." (<http://prhome.defense.gov/MPP/ACCESSION%20POLICY/PopRep2009/>)

Maintaining an effective Navy requires identifying and attracting people with technical aptitude and placing them in ratings that use that aptitude. We explored the



interactions between the Navy's increasing demand for sailors with technical aptitude and pertinent changes in the civilian world, which is part of a larger line of research examining the interaction between the military and civilian labor markets from the late 1990s to the present. We found that the technical requirements for sailors have increased substantially over the past decade. Thus, today's highly technical sailors are more likely than those in the past to serve in technical ratings.

We also found considerable evidence of the importance of "job match"; those with technical aptitude who serve in technical ratings have considerably lower attrition than similar sailors in non-technical ratings. Although there is no evidence that technical sailors come from different geographical areas than others, they do tend to be older and more educated; therefore, recruiting outside high schools may be a key component to attracting those with technical aptitude. In addition, there has

been no drop-off in the percent of applicants who are highly qualified. In fact, it has increased somewhat. This finding debunks a theory that the highly qualified



individuals are still finding jobs in the civilian economy and recession is causing applicants of lower quality to flood to the Navy.

### Shore-Based Infrastructure

The Navy's Shore Facilities Investment Task Force recommended that the Navy change from level-of-effort to output-based risk assessment as the programming methodology for shore infrastructure investment. To support this recommendation, CNA led the development of a prototype shore facilities investment model that would allow the Navy to assess the output-based quality measures of facility condition, capacity, configuration, and capability performance levels across the Future Years Defense Program (FYDP). We designed the model to assess the impact on shore infrastructure readiness by shore capability areas at different levels of infrastructure capital investment funding. We completed the model in time for the Navy to use it as

part of its budgeting process. The Navy will update the model each year to adjust for baseline inventory changes and evaluate the projected impact of current



military construction and special project submissions. The model provides the Navy with a new and unique facilities performance assessment capability to better manage the shore infrastructure and a way to think about shore investment decisions.

### Slider Scheduler

Slider is a desktop computer application developed at CNA to provide fleet schedulers with improved tools for developing and refining employment schedules for naval forces. U.S. Fleet Forces uses Slider to develop and analyze candidate fleet schedule courses of action. Slider can: make comparisons so that a scheduler can rapidly identify differences between two large and complex schedules; keep track of ship loadout of Tomahawks, Standard missiles, and other assets; generate, as a stand-alone tool, a summary Fleet Response Plan operational availability report; generate "holiday notices" that alert the scheduler if he is starting or ending a major schedule phase on a

holiday. In 2010, Slider was certified by the Navy/Marine Corps Intranet (NMCI) and pushed into the classified network. It is now available to thousands of Navy users.



### Marine Corps Recruits: A Historical Look at Accessions and Bootcamp Performance

CNA has maintained personnel databases for the Marine Corps for more than 30 years, with individual accession records going back to 1979. For as long as we have been keeping the official records, we have been analyzing recruit characteristics and attrition through studies and Scientific Analyst memoranda. Over the years, we have identified characteristics that are particularly important to monitor because they are closely associated with successful adaptation to life in the Marine Corps. We have addressed such issues as whether recruit characteristics have changed over time; whether the relationship between recruit characteristics and subsequent attrition has remained stable or has changed; and the most important characteristics for predicting success in the Marine Corps. Although we have focused

primarily on accession characteristics and bootcamp attrition, we have also looked at first-term attrition and long-term retention. A CNA 2010 annotated briefing

Both efforts expanded on previous studies on the same subject and served to strengthen our earlier findings that reduced flight-hour budgets can lead to potentially



analyzes records from 1979 to 2009, providing valuable trend information to the Marines. (<http://www.cna.org/research/2010/marine-corps-recruits-historical-look-accessions>)

### How Many Flight Hours Are Sufficient for Proficiency?

Our goal is to provide Commander, Naval Air Forces (CNAF) with a better understanding of how tactical training contributes to effective carrier air-wing-level performance. We have focused on understanding minimum flight-hour requirements for developing and maintaining safety of flight and tactical proficiency.



devastating effects in terms of aviation readiness. For the safety of flight work, we developed a model that uses fleet flight data and mishap reports to demonstrate the impact of low recent flight hours (i.e., in the past 30 days) and low career hours on the pilot causal factor mishaps. For the tactical proficiency work, we used analysis of combat laser-guided bomb data from Operation Enduring Freedom and Operation Iraqi Freedom to build alternative work-up flight schedules to ensure tactical proficiency. Together, these results helped CNAF structure new flight-hour programs focused on developing and maintaining safety of flight and tactical proficiency in fleet squadrons.

#### Excerpt From: "MARINE CORPS RECRUITS: A HISTORICAL LOOK AT ACCESSIONS AND BOOTCAMP PERFORMANCE"

"Although most Marine Corps manpower analysts have long been aware of high bootcamp and first-term attrition rates for women Marines, few seem aware that—despite these early losses—long-term continuation rates for women exceed those for men. This is true for virtually all the accession cohorts that entered from FY79 to FY94.

"For cohorts entering since FY95, long-term continuation rates have been more equal across the genders. Although in some years the female rate is slightly above the male rate, in other years, the male rate is slightly above the female rate." (<http://www.cna.org/research/2010/marine-corps-recruits-historical-look-accessions>)

# ACQUISITION & FORCE STRUCTURE

## Staying Afloat: Analyzing the Navy's Investment Strategy

As the Obama Administration develops its military spending priorities, U.S. Navy budget analysts will have to find a balance between today's financial situation and paying for future military needs. The Navy's current shipbuilding and aircraft projects indicate the anticipated purchases of major weapon systems over the long term. If adopted, these plans will consume the vast majority of overall Navy procurement funding. Rising costs in recent years suggest current plans may need to be substantially revised. The Director of the Office of Program Appraisal asked CNA to look at how the money is being spent today and whether it will fulfill the need for tomorrow's long-range plans.

To accomplish this goal, we updated our Fiscal Requirements Model to reflect the most recent estimates of procurement and operating costs for the ships and aircraft listed in the Navy's procurement strategy. This update enabled us to provide rough order-of-magnitude estimates of the Navy's top-line budget requirements through fiscal year 2020 and help the sponsor understand the fiscal implications of changes to procurement plans, as specified by the sponsor, in both the near term and long term. We found that the Navy's 30-year shipbuilding plan, published in fiscal year 2009, is likely to require more money every year than currently projected if the Navy does implement its plan to expand the fleet to at least 313 ships. We also found that it is relatively difficult to affect expenditures on operating and maintenance by adjusting ship acquisitions. The long lead time required for ship construction implies that a change today in the number of ships under construction will not affect fleet operations for many years. Our approach in the study can be readily updated as new plans and unit cost estimates are published.

## Putting a Carrot in the Contract: Giving Incentives to Contractors (and CEOs) to Control Costs

The Department of Defense needs to encourage defense contractors to control costs. In a study for the Deputy Assistant Secretary of the Navy (Management and Budget),



we looked at the effect of incentives by examining more than 460 contracts from all services over the 36-year period from 1970 to 2006. We discovered that the type of contract neither triggered nor contained growing development costs, which contradicts the implicit assumption behind the current policy of encouraging fixed-price-incentive contracts or, at the very least, cost-plus-incentive contracts to encourage contractors to toe the bottom line in the development phase. And what about the CEOs of the contracting companies? Was their

## LESSONS LEARNED FROM A SUCCESSFUL DEFENSE ACQUISITION PROGRAM

Analyzing what went wrong is one way to improve, as is analyzing what went right. That's why the Director, Joint Advanced Concepts, Office of the Undersecretary of Defense for Acquisition, Technology & Logistics, asked CNA to examine the history of the F/A-18 E/F Super Hornet program. It's widely acknowledged as a success story in the "how to" of buying weapons and received five major awards recognizing excellence in program management, including the first U.S. Department of Defense Acquisition Excellence Award. To uncover what went right, we convened a panel of principals associated with the successful planning, oversight, and execution of the F/A-18 E/F Super Hornet program and conducted a series of workshops that identified F/A-18 E/F program success factors and attributes. We made 11 recommendations in four areas: leadership, communications and trust, up-front planning, and program stability. We identified "leadership" as the single most important attribute of a program's success and recommended that the Secretary of Defense should direct each military department to establish an acquisition-qualified, dedicated four-star position in its acquisition chain of command. The position would be separate and distinct from the commanders of the Army and Air Force Materiel Commands.

# ACQUISITION & FORCE STRUCTURE



executive compensation affected by the costs of contracts? We looked at the proxy statements of eight major defense contractors. Executive compensation is based, overwhelmingly, on performance as measured in a variety of different ways, but customer satisfaction was mentioned in only one proxy statement. This finding suggests keeping the customer happy and, as a result, receiving award and incentive fees may have little, if any, effect in the larger scheme of executive compensation.

## Interoperability Among Navy Platforms

CNA has made important contributions to identifying and finding solutions for interoperability problems among Navy platforms. We supported the Navy's efforts by being a member of the Interoperability Certification Committee, which investigates combat system interoperability problems across the fleet and evaluates the impact of specific interop-

erability issues between particular ships assembled into carrier strike groups. We provided interoperability analysis of different combat systems as they were incorporated into the systems-of-systems of a strike group. As part of this effort, we highlighted a significant problem that can cause serious command-and-control issues for the warfighter. Because of CNA's efforts to bring this important problem to the attention of the fleet and the Navy's acquisition community, the Navy and Department of Defense leadership requested that a plan be developed to address this issue. CNA supported these efforts with analysis of the various options.

## Assessing the Joint Non-Lethal Weapons Program

Recent emphasis on reducing civilian casualties in Afghanistan has resulted in a reassessment of the use of Non-Lethal Weapons (NLW) in contingency operations. Additionally, NLW are used in force protection and homeland defense

# Situation



scenarios. Frequently, NLW are visualized as a means of disabling potential threats while causing minimum, reversible, physical harm. But NLW also help communicate warnings and ascertain a person's potentially harmful intentions; here the culture of the targeted person, and the cultural context of NLW employment, play key roles.

We recently completed a project for the Joint Non-Lethal Weapons Directorate analyzing how DoD develops and procures NLW for the full spectrum of missions. We analyzed how services and the Joint community identify NLW capability gaps; develop new NLW technology and weapons; and fund, field, and use NLW equipment. The analysis focused on current employment scenarios, including the role of NLW in Iraq and Afghanistan escalation of force scenarios involving use of deadly force. Our analysis led to proposals for improving the Non-Lethal Weapons Directorate's ability to influence NLW procurement and

strengthen the Office of the Secretary of Defense's support for Directorate-developed Non-Lethal Weapons.

## Analyses of Alternatives

In 2010, CNA completed an array of major analyses of alternatives (AoAs). We completed our work on the Joint Expeditionary Fires and the Command Ship Replacement. We also began support for other AoAs, including alternatives for the next Presidential helicopter and alternative Logistics Information Technology systems. In December, we provided a small, follow-on effort to the Navy's Next Generation IT AoA completed the year before. That effort examined the elements of the new NGEN system that would make the greatest contributions to realizing the Naval Networking Environment (NNE). The latter is an effort in the Navy to integrate afloat and ashore network architectures.

# Structure



## Calculating the Lifetime of Hornets

As the inventory of the U.S. Navy and Marine Corps' F/A-18 Hornet continues to age and approach the end of its service life, there's growing concern over meeting operational commitments as well as maintaining the required force level until and through the introduction of the F-35 Joint Strike Fighter. The F/A-18 Program Office at Naval Air Systems Command asked CNA to develop a model and software tool that would allow resource managers, maintainers, and operational commanders to forecast the aircraft-life consumption and inventory based on future operational schedules, a capability that currently does not exist. We looked at past squadron activities and calculated, for each activity, the consumption rate of various aircraft life-limiting variables, e.g., flight hours, total landings, and catapults. We are also working with the command's Aircraft Structural Life Surveillance Branch on a promising method to determine the fatigue life expended (FLE) rate of the Hornet fleet.

## The Navy at a Tipping Point

The Navy Quadrennial Defense Review Integration Group asked us to evaluate the characteristics of a "globally influential navy," determine at what points the U.S. Navy might cease to be globally influential, and describe how fiscally constrained naval force structures will affect our ability to be globally influential. Our work informed discussions among the Navy's senior leadership on potential future force structures, their ability to meet the goals of the Maritime Strategy, and mitigating actions the Navy leadership can consider to delay or avoid shortfalls. The report was titled, "The Navy at a Tipping Point: Maritime Dominance at Stake?" (<http://www.cna.org/research/2010/navy-tipping-point-maritime-dominance-stake>)

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## Excerpts From: "THE NAVY AT A TIPPING POINT: MARITIME DOMINANCE AT STAKE?"

"After 9/11, the Navy shed its role in the Balkans and the Caribbean but increased its homeland defense role and its ballistic missile defense missions, and it has played a major part in strike operations for [Operation Iraqi Freedom] and [Operation Enduring Freedom] for the past decade. The Navy also picked up significant roles in humanitarian assistance, maritime partnership building, littoral combat, and special operational forces (SOF), and routinely had over 10,000 sailors ashore [under U.S. Central Command] to support operations there. If the Navy hoped that reductions in the demand signal would give it breathing room to reset the force and invest in platforms and assets at the expense of operations, its hopes have proved to be false."

"The Navy battle force has shrunk by 20 percent in the last decade, while the number of ships on deployment has remained relatively steady. In a period of constant demand, resources to meet those demands pay for needed future structure, and growing demands for spending on people and health care have shrunk. They will not grow in the future. There is a gap that must be addressed."

"The inherent flexibility of naval people and platforms and assets has been proven again and again. The ability of high-end assets to flex for a number of missions along the spectrum of operations has been a staple of deployments by carrier strike groups and their escorts and their air assets. What has not been proven is the ability of a global navy to use forces that are not dominant or not present overseas to deter challengers, deny regional aggressors, or reassure partners. When you are no longer present in one or two areas of vital national interest with dominant maritime forces, you are at the 'tipping point.' "

## Answering Leadership's Questions about Naval Aviation Force Structure

In his speech to the Navy League, the Secretary of Defense challenged the Navy and Marines to think



critically about the force structure they will need to address future threats. At CNA, we turned to our team of analysts in the Advanced Technology and Systems Analysis division. They specialize in evaluating the ability of different numbers of carriers, carrier air wings, and strike/fighter squadrons to deliver different levels of capability on both a continuing and periodic basis. Since the secretary's challenge, they have been busy providing updated analyses in response to questions from Navy and Department of Defense leadership. For example, CNA is conducting a major effort for the Navy and Marine Corps to improve strike fighter aircraft inventory projections. Because of delays in the F-35 program, the inventory of legacy aircraft is one of the most important issues for the Department of the Navy. We expect these demands for analyses to continue as long as budget increases, schedule delays, and cost growth plague aviation and carrier modernization programs.

## Supporting the U.S. Coast Guard's Analysis of Ship Mixes

We are helping the U.S. Coast Guard's Office of Requirements and Analysis conduct a follow-on to the



2009 Offshore and Aviation Fleet Mix Analysis. This effort, called FMA-2, will apply cost and policy constraints to the fleet mixes that FMA generated, as well as update underlying assumptions about mission demand, asset characteristics, and cost. We've improved their cost models and used them to create a range of cost-constrained future fleet mixes. We helped them combine our cost analysis with a comparison of each fleet's operational effectiveness to create a business case analysis for their future air and surface fleet. We also identified a number of potential future acquisition bottlenecks, as well as opportunities for acquisition tradeoffs that may enable quicker recapitalization for some parts of the fleet. This business case will be the basis for long-term Coast Guard fleet planning, and it will help provide a basis for some major acquisition decisions that the Department of Homeland Security will be making in 2011.

# MILITARY TACTICS

## Plans to Counter Anti-Access Threats

When considering how to execute operational plans, a fleet commander must make assumptions about forward basing



and logistical support. For example, the commander may assume that allied countries will allow certain activities, or that bases on U.S. soil will remain fully available. But what if an adversary used a combination of weapons and tactics that effectively denied U.S. access to a combat theater, nullifying many of those assumptions? Given the need to counter potential adversaries' anti-access strategies, CNA was asked to consider the unexpected: what happens if key planning assumptions fail? We examined the problem in two parts. First, as a test case, we surveyed an expanded list of ports and airfields in the area of responsibility for a particular fleet command and assessed the extent to which those facilities could support some level of U.S. Navy activities. We identified facilities that should be of primary interest to planners, based on risk, proximity, and assets available. We then looked at the implications of unfulfilled assumptions on four areas of logistics support: ship repair, aircraft maintenance, Fleet and Industrial Supply Center support, and weapons loading. In each of these areas, we compared planning assumptions to current plans and identified alternative schemes the Navy could use to support operations. The Navy will use the results to inform contingency plans and the development of robust

fleet support options. The sponsor has requested a continuation of CNA's anti-access project support in FY11.



## Tactics To Respond to Anti-Access Threats

Potential adversaries have an interest in denying the U.S. Navy the ability to effectively operate wherever and whenever the U.S. decides it needs to carry out missions. Part of the solution to the anti-access problem will be an effective set of tactical options for Navy units. CNA was asked by a fleet command to examine how tactics could be developed, tested, and used to enhance the safety and effectiveness of strike group operations. We looked at three issues. First, we examined the history of Navy tactical development to see how lessons from the past can inform future efforts. We found that past success was driven by the personal involvement of three- and four-star commanders, and that a clear and widely communicated concept of operations allowed lower echelons to understand where their ideas could contribute. Second, we examined one example of the anti-access threat and showed how a strike group would have to respond to many threats simultaneously. This approach is in contrast to what U.S. forces often experience in exercises that focus on unit training against one major threat at a time but do not achieve a holistic test of tactics against a complete threat

# Tactic



environment. Finally, we identified circumstances in which different tactics could be mutually incompatible or actually decrease strike group security based on a comparison of each tactic against multiple threats. Our sponsor and other commands are using the results of our work to improve future tactical development efforts. We've been asked to continue this work in 2011 by examining specific tactical proposals and how they can be tested.

### Defense Threat Reduction Agency Fixed-Site Chemical-Biological Requirements

Meteorological models and sensor development dominate Department of Defense discussions of chemical and biological defense. In a previous project for the Defense Threat Reduction Agency (DTRA), we were able to refocus this dialog onto questions more appropriate and relevant for naval operations. Because of the success of that effort, DTRA asked us to examine joint facilities ashore and their commanders' chemical and biological defense modeling requirements. We conducted a detailed study of information requirements at all levels of the chain of command during chemical and biological incidents. We found, as was the case with afloat naval forces, that many of the key questions

commanders would face during an incident were unrelated to detailed meteorological or sensor modeling, but instead could be addressed by simple operational analyses models. We developed prototype operational models that demonstrated how these techniques could help answer commanders' questions. Our work during this project and the previous one for DTRA contributed to significant changes and cost savings in the Joint Operational Effects Federation program budget.

### Impact of Chemical and Biological Threats on Medical Requirements

As a result of our work for the Defense Threat Reduction Agency on chemical and biological modeling, the Navy medical requirements branch of the Assessment Division of the Office of the Chief of Naval Operations (OPNAV N81) asked us to examine how chemical and biological agents would affect medical requirements during major combat operations. Our goal was to look for links between medical and chemical and biological response instead of developing precise models of casualties. We found three key links between medical and ashore chemical/biological operations. First, ships could not accept contaminated



equipment or personnel on board, which can be a problem for amphibious assault operations, because it implies the need for decontamination to be done ashore in proximity to combat. Developing an ashore decontamination capability for the Marines is the second key element in linking medical and operational forces during an assault. The third is the increase in casualties that will occur during combat operations due to the effects of personal protective equipment degrading their ability to conduct combat operations. Navy medical planners may need to handle increased casualties ashore without the refuge of ships. The analysis and war game we conducted at CNA with Navy and Marine Corps participants has led to additional discussion in both the Marine Corps and Navy chemical and biological communities. We anticipate developing detailed, quantitative measures of these effects in a follow-on study.

### Antisubmarine Warfare

Nearly 70 years ago, CNA's first researchers pioneered the field of operations research and analysis by helping the Navy address the German U-boat threat during World War II. We have maintained our roots in antisub-

marine warfare (ASW) and frequently research the capability and value of submarines. In fact, at the request of the Navy Quadrennial Defense Review Integration Group, we prepared a briefing for senior leaders of the submarine force that summarizes U.S. attack submarine operations between 1990 and 2008. Meanwhile, the number of potential threat submarines is increasing worldwide, especially in the Pacific. Improving the Navy's ASW capability and capacity has been a focal point for both the Chief of Naval Operations and fleet commanders. We completed work on two tasks for the Naval Mine and Antisubmarine Warfare Command: assessments of recent peacetime ASW operations and U.S. ASW capabilities and capacities vis-à-vis the evolving worldwide submarine threat.

For the first, we gathered data on individual peacetime operations conducted from 2006 to 2009 and developed options for improving performance. For the second, we characterized threat submarine trends and U.S. ASW trends. We then identified areas where potential mismatches could occur.

# HOMELAND SECURITY

Homeland security efforts encompass a wide array of issues, and CNA analysts apply their skills across the spectrum of work carried out by those charged with ensuring domestic safety. In 2010, CNA work assessed the Federal Emergency Management Agency's (FEMA's) Grant Programs Directorate's cost-to-capability initiative, which was designed to measure the effectiveness of FEMA's grant programs. We analyzed data and developed a process the Directorate can use to improve the effectiveness of its Preparedness Grant Program in several key areas. We also addressed state and local concerns about the original cost-to-capability initiative.

In work with local governments, CNA analysts assessed the ability of the Hampton Roads and Central Virginia regions to respond to a disaster. They conducted data-collection workshops with local jurisdictions to determine current capabilities and identified gaps between those levels and future goals for planning, organization, and training. We also worked with local planners to incorporate their recommendations into a five-year strategic spending plan for homeland security investments.

We have also worked on several health-related studies, including a review of the District of Columbia's emergency plans for responding to an outbreak of H1N1 influenza. Our report documents areas for improvement and details considerations for future pandemic planning.



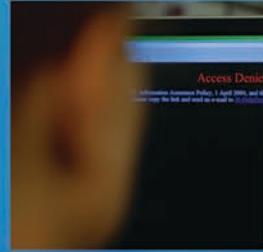
Working better also means working smarter, which is the idea behind the Bureau of Justice Assistance Smart Policing Initiative, an effort to support law enforcement agencies in building evidence-based, data-driven enforcement tactics and strategies that are effective, efficient, and economical. CNA is the Bureau's partner in this initiative, providing analysts who have extensive experience in law-enforcement operations and evaluation to help deliver training and assist with the development and implementation of strategies for the initiative's sites across the country.

## Excerpt From: "SMART POLICING SUMMARY REPORT"

"The Smart Policing Initiative (SPI) is a Bureau of Justice Assistance (BJA)-sponsored initiative that supports law-enforcement agencies in building evidence-based, data-driven law enforcement tactics and strategies that are effective, efficient, and economical. Smart Policing represents a strategic approach that introduces more scientific research methodology into police operations through innovative analysis, technology, and evidence-based applications. The goal of the SPI is to improve policing performance and effectiveness while containing costs, an important consideration in today's fiscal environment. The SPI is a collaborative effort between BJA, CNA, and sixteen local law-enforcement agencies that are testing innovative and evidence-based solutions to serious crime problems." (<http://www.cna.org/research/2010/smart-policing-initiative-inaugural-meeting>)

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