When Evidence Meets Action

For those who believe that research and analysis should inform public policy, early 2009 has offered auspicious signs. The feature story topics in this issue have been RAND research priorities for years but have recently become national priorities for the United States. In each case, the evidence gleaned can now shape the contours of the policies being formed.

Our cover story on controlling government costs is the result of years of investigative research into the causes of cost growth (the increase from cost estimates to actual cost) and price growth (the increase in actual cost from one period to the next). Our team of researchers focused primarily on the spiraling costs of weapon systems.

On the surface, the team found, cost growth often results from unrealistically low cost estimates, while price growth often results from an uncontrolled appetite for higher technological performance. Beneath the surface lay some less expected discoveries: The overuse of contractors appears to be costing taxpayers more money rather than saving it, and some of the reputed acquisition reforms of the 1990s gutted the government oversight systems that had helped keep the costs of contracting under control.

President Barack Obama has asked his budget office for guidance on curbing government costs. Bernard Rostker, Robert Leonard, Obaid Younossi, Mark Arena, and Jessie Riposo offer guidelines for dealing with contractors in particular and for improving the efficiency and effectiveness of government in general.

Some of our proposals for a health information technology network date back to 2005; others have been added since. The president’s economic stimulus package now allots $19 billion for such a network. That is a good start, but a sustained investment of $115 billion over 15 years could yield $628 billion in efficiency savings over that time, with benefits rising thereafter, according to Richard Hillestad and Federico Girosi. Our centerpiece shows how the savings could expand over time as more health providers join the network. The authors outline additional benefits for safety, quality of care, and privacy.

Our final feature story is about negotiating with Iran. President Obama has signaled a new day of engagement with the country, but diplomatic success will hinge on a clear understanding of the country’s political complexity, regional influence, and negotiating culture. Frederic Wehrey marks the hurdles that lie ahead and suggests how to surmount them.

—John Godges
How Do Charter Schools Affect Outcomes? A Look Across Eight States

The number of charter schools continues to grow, but there has always been a contentious debate about whether charter schools provide a better education than do traditional public schools. A RAND study examining the impact of charter schools in eight states has found mixed results.

Proponents contend charter schools expand educational choices, increase innovation, improve student achievement, and provide much-needed competition to other public schools. Opponents argue charter schools lead to increased racial or ethnic stratification, skim the best students from other public schools, reduce resources for those schools, and provide no real improvement in student achievement.

The RAND study assesses the outcomes in four categories—integration, achievement, attainment, and competition—for charter schools in Chicago, Denver, Milwaukee, Philadelphia, San Diego, and the states of Florida, Ohio, and Texas.

In terms of integration, the study finds that charter schools are generally not “skimming the cream” in recruiting students. Students entering charter schools generally have prior achievement levels comparable to or lower than those of their peers in traditional public schools.

As for achievement, little evidence exists that charter schools are producing, on average, results that differ substantially from those of traditional public schools. But the evidence is incomplete, because the performance of charter elementary schools—which constitute a substantial proportion of all charter schools—cannot be easily assessed without test score data of students entering at the kindergarten level, which are unavailable.

“There is reason for concern about low performance among two specific groups of charter schools: those in their first year of operation, and ‘virtual’ charter schools (in Ohio) that serve students remotely through technology rather than in a conventional school building,” said Ron Zimmer, the report’s lead author.

The results for attainment are the most promising for charter schools. In the two locations with available data (Chicago and Florida), charter high schools increase the probability of students graduating from high school by 7–15 percentage points and of enrolling in college by 8–10 percentage points above the probability for students at other public schools.

Finally, in terms of competition, charter schools do not appear to produce effects that substantially help or harm student achievement in nearby traditional public schools.

A previous RAND report on Chicago’s charter high schools found that substantial positive effects on test scores, graduation rates, and college enrollment were solidly evident in only the multi-grade charter high schools (those that include middle-school grades). Additional research is needed to determine how the charter high schools produced these results and whether district-run high schools can produce similar effects by incorporating middle grades and perhaps elementary grades onto the same campus. ■

Methamphetamine Use Estimated to Cost Nation $23 Billion in 2005

Although national household surveys and school-based studies suggest that methamphetamine (meth) is a relatively minor drug of concern, regional data systems, law enforcement agencies, and county hospitals indicate it is the most significant problem facing the populations they serve. A comprehensive national assessment by RAND addresses these conflicting data, concluding that “the economic burden of meth abuse is substantial,” according to Nancy Nicosia, the lead study author.

Researchers were constrained by the facts that meth use data are far from complete and comprehensive and that the scientific literature has yet to develop consistent evidence of causal associations for many of the harms meth is believed to cause. Given this uncertainty, researchers created a range of estimates, as shown in the table. The best estimate of the overall economic burden of meth use in 2005 (the most recent year for which the needed data are available) is $23.4 billion, with a low estimate of $16.2 billion and a high one of $48.3 billion.

Researchers found that around 70 percent of the costs result from the intangible burden that addiction places on dependent users and from their premature mortality. The intangible burden was measured by quantifying the impact of the lower quality of life on those addicted to the drug. The best estimate of premature deaths from meth use in 2005 was around 900.

Crime and criminal justice expenses, which account for the second-largest category of costs, include the burden of arresting and incarcerating drug offenders and the costs of additional crimes committed under the influence of meth or to support meth habits. Lesser costs include lost productivity, health care spending from meth-involved illnesses, and drug treatment.

The study also captures two new categories of costs for the first time: child endangerment and meth production. No previous national study has examined child endangerment costs, but they are nontrivial, exceeding the costs of lost productivity and drug treatment. Costs associated with meth production are unique to this drug, because toxic chemicals can generate fires, explosions, and other events. These costs include the injuries of emergency personnel and other victims, along with efforts to clean up the hazardous waste from the production process.

The study argues for caution in interpreting the evidence from national household surveys and school-based studies. Those who impose the greatest cost on society are those who become addicted, engage in crime, need treatment or emergency assistance, cannot show up for work, lose their jobs, or die prematurely—populations that are not adequately represented in household- or school-based surveys.

The new data “highlight the consequences of meth use and focus attention on the primary drivers of those costs, but more work is needed to identify areas where interventions to reduce these harms could prove most cost-effective,” Nicosia said.


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### Key Drivers of Meth Social Costs Are “Intangibles/Premature Death” and “Crime/Criminal Justice”

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<thead>
<tr>
<th>Cost Contributor</th>
<th>Social Cost of Meth Use in the United States in 2005 (in millions of dollars)</th>
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<td>Lower Bound</td>
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<tr>
<td>Intangibles/ premature death</td>
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<td>Crime/criminal justice</td>
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<tr>
<td>Meth production/ hazard</td>
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<td>Total</td>
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Hispanics Underrepresented Among U.S. Enlistments, Despite Interest

Hispanic youth are underrepresented among enlistments in all branches of the U.S. armed forces. According to a RAND study, these youth fail to meet eligibility requirements despite their greater interest in military service.

The figure shows that most youth in the United States do not qualify for enlistment in any military branch, based on the National Longitudinal Survey of Youth from 1997 to 2003. But Hispanic and black youth are disqualified more often than white youth, as are women within most racial and ethnic categories.

The study identifies why Hispanics in particular are underrepresented among enlistments, given the common disqualifying factors of education, Armed Forces Qualification Test (AFQT) score, weight, number of dependents, convictions, and drug-related offenses. For Hispanics, the key factors are below-average rates of high school graduation, lower AFQT scores—possibly because of language difficulties—and being overweight.

In contrast, a 2007 U.S. Department of Defense poll of American youth ages 18 to 24 found relatively high interest in military service among Hispanics. Thirteen percent of Hispanic respondents said they were probably or definitely going to join the military, compared with 10 percent of black and 7 percent of white respondents.

"Hispanics who join the military tend to serve longer and be promoted faster than their white counterparts," said Beth Asch, the lead author and a RAND senior economist. “What is needed are strategies to help more Hispanics meet recruitment standards or to recruit more intensively among those who already meet the standards.”

The military could recruit more overweight candidates by enrolling them in weight-reduction programs while they are in its Delayed Entry Program. The military could also relax the weight standards at entry or stratify the weight requirements by job description. Or it could ease the weight standard while retaining the strength standards, an option the U.S. Marine Corps has adopted and the U.S. Army is testing.

Disqualifying factors such as high school graduation rates and low AFQT scores may be difficult for the military to overcome, because these factors depend greatly on outside influences, from the recruits’ parental education levels to family income. But through outreach efforts that emphasize the benefits of being eligible for military service, the military may be able to inspire potential recruits to complete their education, according to researchers.

For Hispanic youth with more education (especially some college), the military faces significant competition from civilian employers and colleges, the study finds. For these youth, military recruitment efforts should promote the availability of higher education benefits, leadership opportunities, and the chance to serve one’s country.

Most U.S. Youth Don’t Qualify for Military Enlistment, but Blacks and Hispanics Qualify Less Often Than Whites, and Women Usually Qualify Less Often Than Men

NOTES: “Education” refers to high school diploma or general education degree; “AFQT” refers to Armed Forces Qualification Test.

Mumbai Terrorist Attacks Show Rise of Strategic Terrorist Culture

The November 2008 terrorist attacks in Mumbai, India, may qualify as India’s 9/11, significant in their audacity, their ambition, the complexity of the operation, and the diversity of targets—according to a RAND study completed in December 2008 and updated in January 2009.

“India will continue to face a serious jihadist threat from Pakistan-based terrorist groups, and neither Indian nor U.S. policy is likely to reduce that threat in the near future,” said Angel Rabasa, lead author and a RAND senior political scientist. “Other extremist groups in Pakistan likely will find inspiration in the Mumbai attacks, and we can expect more attacks with high body counts and symbolic targets.”

The study provides evidence suggesting that planning began as far back as mid-2007, as shown in the timeline. The attacks were precisely planned and well-coordinated: The terrorists had detailed maps and information about each of the targets they hit, and the multiple targets were carefully chosen for their religious, political, and cultural values. The attacks killed more than 170 people and injured nearly 300.

“The defining characteristic of the Mumbai attack, and what makes it so alarming, is not just the ruthless killing, but the meticulous planning and preparation that went into the operation,” said Brian Michael Jenkins, a leading terrorism expert and RAND senior adviser. “This indicates a level of strategic thought—a strategic culture—that poses a difficult challenge: Not whether we can outgun the terrorists, but can we outthink them?”

The report analyzes key weaknesses in India’s general counter-terrorism and threat-mitigation structure, including gaps in coastal surveillance, inadequate “target hardening,” incomplete execution of response protocols, response timing problems, inadequate counter-terrorism training and equipment for the local police, limitations of municipal fire and emergency services, flawed hostage-rescue plans, and poor strategic communications and information management.

The attacks have significant and potentially far-reaching implications for India, Pakistan, and the international community. Specifically, India is inclined to hold Pakistan responsible for the attacks and may look for a way to deter future attacks. Both countries have nuclear weapons, making any military action a dangerous course, but continuous terrorist attacks on India from terrorist bases in Pakistan could provoke a military confrontation.

On the other hand, the focus on Pakistan should not obscure the fact that the terrorists likely had help from inside India. Local radicalization is a major goal of the terrorists and a major political and social challenge for India.

Still, the Mumbai attacks underscore the need to address the transnational sources of Islamist terrorism in India. How to do this is an extraordinarily difficult question that will require the international community to reassess its policies toward Pakistan.

NOWADAYS, ONE IS HARD-PRESSED to find anyone who does not believe that global warming is taking place and that man contributes to it. Instead, the focus has shifted to trying to understand what the climate change evidence tells us about what is happening and how fast it is happening.

An atmospheric scientist and president of the National Academy of Sciences, Ralph Cicerone has been on the front lines in helping to shape science and environmental policy, having led a 2001 study at the request of President George W. Bush to understand the current state of climate change and its impact on the environment and human health. As the guest speaker at a recent Haskins Lecture, a series endowed by former RAND trustee Caryl P. Haskins and his wife Edna to bring distinguished scholars in science-related areas to speak at RAND, Cicerone focused on the nature of climate change and the challenges that lie ahead.

A Rising Sea of Evidence
Cicerone pointed to accumulating scientific evidence of a growing imbalance between the amount of energy the earth receives from the sun and the amount it releases back into space. Carbon dioxide concentrations worldwide have increased by 35 percent in the last 100 years because people annually emit more than 8 billion tons of carbon in the form of carbon dioxide into the earth’s atmosphere from burning fossil fuels. Consequently, the atmosphere now traps an additional 1 percent of the sun’s energy near the earth’s surface. While 1 percent might not seem like much, this increase in the space of one human lifetime is unprecedented, Cicerone noted.

Where the carbon dioxide comes from is also changing. Cicerone said that world energy usage doubled from 1970 to 2005 and is projected to grow more than 70 percent in the next 20 years, mostly as a result of economic growth in countries such as India and China. “In each of the last three years,” he pointed out, “China has added nearly 100 gigawatts of electrical capacity from coal-fired power plants—more than the entire electrical capacity of a France or Germany.”

The impact of this increase in greenhouse gases has been felt in rising temperatures and sea levels and in decreasing ice levels. Cicerone drove home the point that ever more precise scientific evidence corroborates these findings. Data going back a century show that sea levels have risen on average about one and a half millimeters a year; modern, more precise, data not only confirm this trend but also show that the rate of the rise today has more than doubled in the last decade and a half. Similarly, Cicerone said that 40 years of U.S. Navy data from the Cold War era show that the ice depths in the Arctic became 40 percent thinner over that time, while satellite imagery confirms that the ice expanses themselves are also growing smaller.

An Overflowing Tub
In thinking about how to address such challenges, Cicerone used the metaphor of a tub. “We are now filling the tub with 8 billion tons of carbon in the form of carbon dioxide a year—10 if you include tropical deforestation—while the earth’s lands and oceans have the natural ability to absorb about 3.1 billion tons of
carbon per year. The tub simply cannot drain fast enough, so we must greatly decrease the inflow.”

What would it take to reduce carbon emissions by just 1 billion tons a year? (One billion tons of carbon is 3.7 billion tons of carbon dioxide.) Cicerone provided five answers. We could reduce a billion tons of carbon emissions annually by increasing the energy efficiency of all buildings worldwide by 20 to 25 percent, or by increasing the fuel efficiency of two billion cars from 30 to 60 miles per gallon, or by capturing all the carbon dioxide from 800 one-gigawatt coal-fired power plants, or by replacing 700 one-gigawatt coal-fired power plants with nuclear power plants, or by replacing those same 700 one-gigawatt coal-fired power plants with a million two-megawatt wind turbines.

Viewed in this light, mitigation can seem overwhelming, but Cicerone praised California as an example of how mitigation can work on a smaller but important scale. Both California and the United States used about the same amount of electricity per person in 1960—around 4,000 kilowatt-hours per capita. But by 2006, national usage had tripled to about 12,000, while California usage had less than doubled to about 7,000.

What accounts for the difference? Energy-efficient appliances, particularly refrigerators. Cicerone singled out high-efficiency refrigerators and other appliances as cost-effective means to reduce energy use significantly. These improvements, he said, had been stalled by such market constraints as low consumer awareness, high initial costs, and the lack of effective policy.

But under the auspices of the California Energy Commission, the state began to set strong policy in 1976, adopting standards and regulations for appliances to make them more energy-efficient. Manufacturers initially opposed the regulations, arguing that they would make appliances too expensive. As it turned out, the standards and regulations actually stimulated the development of technology that allowed the manufacturers to meet the state specifications cost-effectively. The end result was far more energy-efficient and cost-effective appliances that met consumer needs. Electricity pricing strategies also helped to contain demand in California.

**A National and Global Fever**

At the national level, mitigation efforts are often constrained by conflicting goals. If a nation’s goal is to achieve energy security or energy independence, Cicerone said, then it makes sense to focus on developing domestic coal and oil, nuclear power, and renewable resources like wind and solar power and biofuels. But if the goal is to mitigate climate change, then the focus should be on renewable energy sources, nuclear power, and carbon capture and sequestration.

Realistically, nations will pursue both goals simultaneously, requiring a delicate balancing act. But for nations struggling to balance the goals and constraints, Cicerone offered this promising insight: “Fuel efficiency turns out to be the one win-win strategy that satisfies all goals by reducing energy dependence, carbon dioxide emissions, and air, land, and sea pollution.”

On a global level, Cicerone sees the need for worldwide leadership from both political and business leaders to move beyond polarization and to deal with climate change mitigation and energy security continuously over time. “Balancing energy and climate concerns does not lend itself to a one-time solution. Leaders will need to return again and again in efforts to address changing concerns.”

Cicerone also warns that efforts aimed at climate change mitigation are no longer enough. With scientific evidence beginning to show that the rate of global warming and its consequences are increasing beyond what the computer models projected only a few years ago, the world will also need to focus on adaptation to reduce the adverse effects that will occur.

Adaptation could necessitate measures that will dramatically alter the lives of millions, perhaps billions, of people. These measures could include, among other things, changing the crop patterns in regions that become drier or wetter, developing better heat-resistant and drought-resistant plant varieties, strengthening public health and environmental defenses against an increase in tropical diseases, building new water projects either to control flooding in areas that are increasingly inundated or to capture more water in areas of increasing drought, and avoiding further development on flood plains or near seashores as ocean levels continue to rise.

“Fuel efficiency turns out to be the one win-win strategy that satisfies all goals by reducing energy dependence, carbon dioxide emissions, and air, land, and sea pollution.”
ONE OF THE MOST NOTABLE DIFFERENCES between the foreign policies of the Obama administration and those of its immediate predecessor is the Obama team’s commitment to “a rebalancing of America’s national security portfolio” by putting greater weight on “soft power” relative to military and economic “hard power.”

As defined by Harvard political scientist Joseph Nye Jr., in his 2004 book *Soft Power: The Means to Success in World Politics*, soft power is “the ability to get what you want through attraction rather than coercion or payments. It arises from the attractiveness of a country’s culture, political ideals, and policies.”

Of the many soft power resources available to the United States to help the nation rebalance its security portfolio, Radio Free Europe/Radio Liberty (RFE/RL) could be among the most effective. Its role has recently become more important than ever, according to Jeffrey Gedmin, president of RFE/RL, who recently spoke at RAND.

**Same Mission, Broader Strategy**

Established in 1949 and funded by the U.S. Congress, RFE/RL has had the same mission for decades—to “broadcast uncensored, accurate news and information to people in countries where their own governments deny them a free flow of information and ideas.”

What was once directed at Eastern Europe and the Soviet Union is today focused on Eastern and Southeastern Europe, Russia, the Caucasus, Central Asia, the Middle East, and Southwest Asia. Working from a broadcast center in Prague, RFE/RL airs nearly 1,000 hours of programming a week to 20 countries in 28 languages, from Albanian to Uzbek.

“We don’t do propaganda. We don’t do ‘psychological operations,’” said Gedmin. “We provide news and information that people cannot get from their host countries. That’s why people tune in to us.”

As a 21st-century media company, RFE/RL has moved beyond radio broadcasting. In addition to airing programs via AM, FM, shortwave, and satellite frequencies across 11 time zones, it also produces television programming with local partners and has an interactive presence on the Internet. “In May 2007, more than 2.5 million people visited our Web sites and listened to 600,000 hours of Internet audio broadcasts,” said Gedmin.

Although RFE/RL maintains bureaus in 17 of the 20 countries to which it broadcasts, Gedmin said that many of the local governments act to “impede our ability to produce honest, fair-minded journalism.” Local bureau correspondents often face imprisonment or worse. RFE/RL correspondents have been beaten or subjected to police intimidation throughout its broadcast region, been kidnapped in Afghanistan and Iraq, and been killed in Iraq and Turkmenistan.

RFE/RL’s Uzbek Service was driven from its bureau in Tashkent in 2005 in the wake of the Andijan massacre, which the service covered extensively. In 2008, officials in Azerbaijan and Kyrgyzstan banned RFE/RL from the
local airwaves, while the web sites of the Belarus Service, Kazakh Service, and Persian Service (Radio Farda) were subjected to cyberattacks and access blockages.

**Paternal Libertarianism**

Gedmin stressed the fine line that the organization must walk in being a surrogate news source. It is not the Voice of America (the broadcasting service of the U.S. government abroad), which emphasizes in-depth coverage of the United States in addition to international and regional news.

“We must be viewed as a legitimate, credible news agency, which is why we are deliberately independent of any branch of the U.S. government—the state department, the defense department, and Congress itself. Our oversight agency, the Broadcasting Board of Governors, provides a firewall between us and the U.S. government,” said Gedmin. “We cover the U.S. when it is part of the news story.”

Gedmin said he practices a philosophy of “paternal libertarianism” in running RFE/RL. On the libertarian side, “I don’t get deeply involved in micro-managing the journalists who work for us. They must be viewed as what they are: authentic, indigenous, home-grown voices for their countries.” On the paternal side, he is forced on occasion to step in to manage the “untidy process of adhering to journalistic standards,” especially since many of the organization’s journalists come from countries with a limited history of a free media.

**Weight of Air**

Gedmin readily concedes that there is no single, good measure for weighing the organization’s impact. “A short and ineffective answer is audience size,” he said, noting a 52 percent market share of radio listeners in Afghanistan in 2008. But the real impact is measured more in “anecdotal and impressionistic terms,” he said.

Evidence comes from testimonials of those who have heard the broadcasts abroad. For instance, one of the audience members at the talk at RAND described her experience as a child in Romania, listening with her family to the “warbly” sound of the broadcasts.

Gedmin recounted a story about three people on the road between Kabul and Kandahar listening to Radio Free Afghanistan on an old battery-powered radio. “We have to buy batteries for it, because we don’t have electricity here,” they explained. “We’re willing to give up three or four days of wages to buy those batteries and not eat for a day or two, because we need to hear trustworthy information about our country.”

Another measure of success is the degree to which repressive governments try to block access to RFE/RL programming. “We know we’re having an impact because the governments of several of the countries to which we broadcast actively jam our signals,” Gedmin said. “Iran spends four times as much to jam us as we spend on Persian programming. The regime threatens our journalists and blocks our Internet site. That tells our journalists we are reaching their pressure points.”

The idea of RFE/RL, he said, is “to promote political evolution, not regime change.” The long-term goal is to “go out of business” as more and more countries evolve toward democracy and a free media.

But in the meantime, Gedmin argued for increased funding and for rewriting his organization’s congressional charter to allow for public-private partnerships as one way of raising funds. Current annual funding for RFE/RL is around $82 million, down from a high of $252 million during the Cold War. In the context of hard versus soft power, Gedmin noted that RFE/RL’s “budget is about the cost of four Apache helicopters.”

**Related Reading**

Advanced Care
The Promise of Health Information Technology for Cost, Quality, and Privacy

By Richard Hillestad and Federico Girosi

Electrical engineer Richard Hillestad is a senior principal researcher at RAND and a professor at the Pardee RAND Graduate School. Federico Girosi is a RAND senior policy researcher.

“We will . . . wield technology’s wonders to raise health care’s quality and lower its cost,” declared President Barack Obama during his inaugural address on January 20, 2009.

Exactly four weeks later, on February 17, he signed into law a $787-billion economic stimulus package that sets aside $19 billion for health information technology (HIT). Of that sum, $17 billion will cover incentive payments from the Medicare and Medicaid reimbursement programs to help hospitals and physician offices adopt electronic medical record systems.

These policies align with recommendations RAND has made since 2005. However, we consider the $19 billion for HIT in the February economic stimulus package to be merely a down payment, although a sizable one, toward fulfilling the promise of HIT.

Our focus is on the costs and benefits of HIT for the United States at a national adoption level of 90 percent, which might take 15 years to attain. Over those 15 years, we project total HIT costs of $115 billion, potential efficiency savings of $628 billion, and thus potential net savings of $513 billion or more. This translates to average annual costs of $8 billion, average annual efficiency savings of $42 billion, and average annual net savings of $34 billion or more. All these estimates are in 2004 dollars.

The benefits should grow as HIT spreads throughout the health care system. After 15 years, the nationwide adoption of electronic medical records and of networking among health care providers could save more than $77 billion each year in terms of efficiency alone and another $4 billion each year in terms of drug safety. Although the potential savings appear large, $81 billion is about 4 percent of the annual $2 trillion cost of health care in the United States. HIT-enhanced preventive care and management of chronic diseases could increase those savings while improving health and providing other social benefits (fewer days lost at work or school, for example).

We emphasize that these figures represent the potential benefits of HIT. These figures also assume that interconnected and interoperable electronic medical record systems are adopted widely and used effectively. The current evidence is not robust enough to allow strong predictions. However, we do not report the best-case scenarios, either, but rather the mean value of potential savings based on the current evidence.

By the end of 2009, the U.S. Department of Health and Human Services plans to develop a set of standards that will determine not only how electronic medical records should work and what they should include, but who should control them and how. To derive the full benefits from HIT, we propose that the nation also create unique patient identification numbers for every person in the country. Such a system will not endanger but rather enhance personal privacy while reducing medical errors, increasing efficiency, and simplifying the use of electronic medical records.
Benefits Package

HIT is shorthand for an electronic medical records system that replaces the paper medical record and incorporates such associated functions as clinical decision support, patient tracking, reminders for preventive services, computerized physician order entry to check proper prescribing (and to reduce adverse drug events), and electronic connectivity among health care providers and, in some cases, among providers and patients.

The health records for most people today are still stored on paper, and the transfer of records from one doctor to another is still most often done by phone or fax. These practices are highly prone to errors, such as illegible handwriting; the loss of records of expensive medical tests; and deadly, but preventable, mistakes.

The hope is that the broad adoption of HIT will transform health care by making it more efficient and simultaneously more effective. Greater efficiency would result from reduced test duplication, improved drug utilization, better scheduling, reduced handling of paper records, and expedited processing and billing of claims. Greater effectiveness would result from reduced errors, continual evidence-based decision support, reminders for preventive care, improved management of chronic illness, and improved continuity of care for those patients seeking it when they are away from their primary providers.

But we are a long way from reaching these goals. As of 2005, about 20–25 percent of hospitals and 10–15 percent of physician offices had adopted HIT systems. More recent estimates indicate that hospital-based adoption has improved but that the functionality of many of the adopted systems remains limited. Meanwhile, there has been relatively little change in physician adoption of HIT. Most important, only about 4 percent of physicians have HIT systems that incorporate some of the key supporting functions.

The $115 billion in total costs for HIT over 15 years includes software licenses, hardware and its maintenance, planning, training, implementation, and either reduced revenue or increased provider costs during implementation. Of the $628 billion in total potential efficiency savings throughout those first 15 years, about 75 percent of the savings would be associated with hospitals, and 25 percent would be associated with physician offices.

In hospitals, major savings would come from shorter patient stays (thanks to improved scheduling and more timely and effective care), less nursing administrative time (and therefore lower demand for nurses), less chart administration, reduced drug costs, and fewer laboratory and radiology tests. In physician offices, the savings would come from reduced drug costs, more efficient chart handling, fewer transcriptions, and fewer laboratory and radiology tests (see the centerpiece on pages 16–17).

The reduced drug costs would come from aligning prescriptions with their formulary rules, recommending generic drugs when available, advising physicians of the costs and benefits of specific drugs, encouraging providers to discontinue unnecessary or harmful drugs, and encouraging timely conversion from intravenous to oral medications.

We did not estimate the efficiency savings from billing and claims administration, but we expect those to be substantial. Neither did we estimate possible process improvements that have become the typical consequences of information technology in other industries. Therefore, while our estimates indicate significant potential efficiency savings of $77 billion annually after 15 years, we do not consider our estimates to be overly optimistic.

In addition to the efficiency savings, we project safety benefits of $4 billion per year after the first 15 years, owing to the annual avoidance of up to 2.2 million adverse drug events and their subsequent costs. These events would be averted by reduced handwriting errors, better warnings of allergies and drug interactions, and better dosage monitoring. Because most prescribing occurs in physician offices, the magnitude...
of this benefit would depend heavily on physician adoption of HIT.

As for health benefits, HIT would enable substantial improvements in managing chronic illness. About 75 percent of the U.S. health expenditure is associated with people with chronic illness. What is needed in such cases is better coordination and communication across providers dealing with the multiple impacts of a chronic illness, along with substantial patient screening, monitoring, and involvement. As exemplified by the electronic medical records system now used by the U.S. Department of Veterans Affairs, networked HIT provides a way to coordinate support, monitor patients, and involve the patient in a team of care.

We simulated the health benefits of improved management of four chronic illnesses: asthma, diabetes, congestive heart failure, and chronic obstructive pulmonary disease. If all eligible patients participated nationwide, the changes in treatment and lifestyle triggered by HIT could yield 20 million fewer inpatient days, 5 million fewer emergency department visits, 9 million fewer office visits, and 20 million added workdays per year.

We did not estimate potential HIT savings from healthier patients, because it is not always true that reducing the incidence of a disease reduces health care costs. In fact, costs can rise or fall depending on the effect of health care on longevity and the occurrence of other diseases.

Market Failures

There are four imperatives for government leadership in HIT. The primary one is a market failure: Those who must purchase the HIT systems (the hospitals and physicians) are not the ones who would reap most of the savings (the insurers) or the health benefits (the patients). Of the $115 billion in costs over the first 15 years, about $98 billion would be borne by hospitals, and about $17 billion would be borne by physicians.

Except for health systems that are both insurer and provider, such as Kaiser Permanente, there is little financial incentive for hospitals and physicians to bear the costs of HIT and to disrupt their practices for its implementation. The insurers would garner the savings from reduced duplication of tests, shorter hospital stays, better drug utilization, and so on. Meanwhile, better management of illnesses would mean fewer visits of sick patients to hospital emergency departments and physician offices, reducing hospital and physician revenue. This market failure is a key indicator of the need for government intervention.

Second, larger hospitals and physician practices are adopting HIT at a much higher rate than smaller, less endowed ones. Without any government intervention, the end result of market-based HIT could be increased disparities in health care.

Overcoming these first two constraints will require expanded subsidies for hospitals and physicians. The most appropriate parties to pay the subsidies could be the insurers, which stand to gain most of the benefits. It is thus fitting that the president has assigned Medicare, the largest insurer, to exercise leadership in this regard. Subsidies might also be targeted to smaller hospitals and physician offices and to those serving disadvantaged populations.

Third, there is little market incentive to manage the electronic infrastructure required to reach across providers and to connect them into a network of interoperable systems that could support a patient’s care wherever and whenever it is needed. This is another area in which the government will need to play a larger role. Fourth, America’s current privacy and security protections are inadequate for a national health information network. An important government role will be to establish the privacy protocols for such a network.

Privacy Protections

To protect patient privacy, most of the U.S. health care system today relies on statistical matching methods
that link patients to their health data by use of personal attributes, such as name, address, zip code, and birth date. The problem with these data is that they are often not unique to the individual, they change over time, or they are entered into different systems in different formats, often with errors. The repeated collection, distribution, storage, and use of these data also pose a substantial identity-theft risk.

There are important health, safety, efficiency, and privacy reasons for moving the United States away from the inherent risks of statistical approaches and toward a unique patient identifier for health care. Creating a unique patient identification number for every person in the country would reduce medical errors, simplify the use of electronic medical records, and increase efficiency. Such a system should also enhance privacy, because it would not involve sending large amounts of personal data across the health care network.

It might seem logical to use a Social Security number for this purpose; however, the widespread use of the Social Security number for so many other purposes has led to its being frequently compromised as a secure identifier. Furthermore, the Social Security number lacks the types of protection built into modern identifiers, such as “check digits” that can detect erroneous entries. For a national health information network, it would be better to use a different number or alphanumeric code.

Many privacy concerns related to unique patient numbers could be addressed with laws that severally punish those who misuse information retrieved with the numbers. And in contrast to using personal information, a system that uses a new unique number would simplify the reestablishment of security after any breach of a patient’s health information.

Giving people the choice of whether to acquire a unique patient number could further reduce privacy concerns. Those worried about misuse of a number could simply opt out. A voluntary national system would cost about $25 million for the first five years for issuing the unique patient identifiers. We estimate an additional cost of registering all people in the country to be about $1.5 billion ($5 each for 300 million individuals, based on 5 minutes of health-care-provider office time at $1 per minute).

Most individuals and organizations now addressing this issue are focused on privacy and security, but very few have addressed the distinction between statistical matching and unique patient identifiers. If the methods were debated publicly, the privacy and security risks of statistical matching would likely become an issue. But without this debate, statistical matching has had the advantage of requiring no new national policy and has therefore avoided being judged under the bright lights of public scrutiny.

Related Reading


The Potential Benefits and Costs of Increased Adoption of Health Information Technology, Richard Hillestad, RAND/CT-312, testimony presented before the Senate Finance Committee on July 17, 2008, 8 pp. As of press time (Web only): www.rand.org/pubs/testimonies/CT312/


ELECTRONIC MEDICAL RECORD SYSTEMS offer three kinds of potential benefits: efficiency savings, drug safety, and improved patient health. The charts below compare only the efficiency savings to the total costs of adoption and implementation of electronic medical record systems by 90 percent of U.S. physician offices and hospitals—a gradual process that would stretch over the next 15 years. All figures are in 2004 U.S. dollars.

The higher the adoption rate over time, the greater the savings, thanks to the growing ability of health care providers to connect to an expanding network of interoperable information systems that could support a patient’s care wherever and whenever it is needed. At physician offices, annual efficiency savings would rise to $20 billion by year 15; the average annual efficiency savings over the full 15 years would be $11 billion, compared to average annual costs of $1 billion. At hospitals,
over the First 15 Years, Then Keep Growing

Annual efficiency savings would hit $57 billion by year 15; the average annual efficiency savings over the full 15 years would be $31 billion, compared to average annual costs of $7 billion. Overall, annual efficiency savings would climb to $77 billion by year 15, with average annual efficiency savings totaling $42 billion in comparison to average annual costs totaling $8 billion. While occurring at physician offices and hospitals, the savings would accrue primarily to the insurers that pay for health services.

In year 15, the net savings at physician offices would be $18 billion, and the net savings at hospitals would be $46 billion. The net cumulative savings nationwide over 15 years would be more than half a trillion dollars, or an average of $34 billion a year. Beyond year 15, at a nationwide adoption level of 90 percent or more, the annual efficiency savings would stabilize around $77 billion a year, while the costs of adoption would then decline.

CUMULATIVE SAVINGS

Cumulative efficiency savings would be five times greater than cumulative adoption costs.

Net cumulative efficiency savings would grow to a combined $513 billion over 15 years.

Cost Controls
How Government Can Get More Bang for Its Buck

By Bernard D. Rostker, Robert S. Leonard, Obaid Younossi, Mark V. Arena, and Jessie Riposo

Bernard Rostker is a senior fellow at RAND and a fellow of the National Academy of Public Administration. Cost analyst Robert Leonard, management scientist Obaid Younossi, physical scientist Mark Arena, and operations researcher Jessie Riposo are all RAND researchers.

Controlling government costs, a perennial priority for taxpayers, poses a dilemma for the administration of President Barack Obama. The president has coupled his commitment to boost spending as needed for economic recovery with a promise to cut spending as required for fiscal responsibility. Hoping to save $40 billion a year in federal procurement spending, he has ordered his budget office to issue new guidelines by September 30, 2009, for awarding government contracts to private firms.

The problems at issue are prevalent and yet particular. Over the past several decades, RAND teams have identified many causes of excessive cost growth across U.S. government agencies, both civilian and defense. Causes range from faulty cost estimates for weapon systems at the outset of such programs to increased technological complexity and performance over the life of those programs. Still other causes pertain to the management of workforces and workloads in general and specifically in connection with the expanded use of contractor personnel.

Beyond identifying the key causes of rising costs, we offer suggestions for reducing government expenditures while enhancing government effectiveness. We summarize our conclusions here:

• Curtail the overuse of contractors. The U.S. government needs to bring the unfettered use of private contractors under control. The overuse of contractors appears to be costing taxpayers more money rather than saving it, and shortages of government employees limit the government’s ability to monitor those same contractors.

• Base budgets on realistic cost estimates. The average percentage increase above estimated cost for U.S. military weapon programs has remained high over the past three decades. Better cost estimates would not necessarily save money but would give policymakers a better basis for deciding whether to embark on costly investments in the first place.

• Ensure rigorous oversight. The defense acquisition reforms of the 1990s gutted government oversight of contractors. The process of estimating contractor costs has also been tainted by bureaucratic conflicts of interest. It is important to make cost-estimating functions more independent of program offices that hold advocacy positions, to collect more data that are more relevant, and to verify the capabilities of contractors.

The overuse of contractors appears to be costing taxpayers more money rather than saving it, and shortages of government employees limit the government’s ability to monitor those same contractors.
• *Rethink technical requirements.* The purchase prices of U.S. military ships and aircraft have risen faster than the rate of inflation. Ships could be built less expensively by limiting their requirements, sizes, or missions. For aircraft, a difficult choice must be made between quantities and capabilities. Both the U.S. Navy and U.S. Air Force appear to be opting for fewer aircraft with the highest capabilities, resulting in very expensive systems and steadily dwindling fleets.

• *Consider hiring more shipyard workers.* The navy spends $4 billion a year on ship maintenance but consistently underestimates the workload, resorting to excessive overtime levels. Increasing the number of permanent journeymen at public shipyards could reduce high overtime levels and hedge against future workload growth, at virtually no additional cost.

**Curtail the Overuse of Contractors**

The federal government must limit the functions it has been contracting out and engage more government workers to do the work of government. The high costs of contract workers relative to government employees, combined with the number of private firms the government is now taking legal action against, are unnecessarily costing the taxpayers billions of dollars.

Antigovernment sentiments have been in vogue since the 1970s, partly as a result of the loss of confidence in government following the Watergate scandal. Leaders of both major political parties have considered a decline in the number of federal employees to be a measure of merit. To this end, federal administrators have increasingly substituted government personnel with contract personnel. The U.S. Congress and the Office of Management and Budget have even imposed federal personnel ceilings that push managers to hire contractors rather than government employees, often granting new tasks to existing contractors without competition.

Today, the U.S. government faces an unparalleled crisis in its ability to do the nation’s business. Decades of neglect and hostility toward the federal civil service, together with the coming loss of experienced workers due to an unprecedented number of retirements, will exacerbate problems that the U.S. Government Accountability Office (GAO) has been highlighting for years.

In 1991, GAO compared the costs of 12 contractors with the costs of government employees working for the U.S. Department of Energy. On average, 11 of the 12 contractors were 25 percent more costly than their federal counterparts. In 2007, the U.S. House Select Committee on Intelligence found that, on average, an intelligence community contractor cost almost twice as much as a government employee. In 2008, the U.S. Office of the Director of National Intelligence concluded that the full salary and benefits for government employees averaged $125,000, whereas the direct labor cost per contractor, excluding overhead, averaged $207,000.

As the federal workforce has shrunk, it has also aged, portending what the U.S. Merit Systems Protection board in 2008 called a “brain drain” because of high retirement eligibility rates. Figure 1 shows the sharp increase in the number of civil servants who are now eligible to retire.

And as the contract workforce has expanded, government oversight has waned. In 2007, GAO found numerous cases in which the U.S. Department of Homeland Security “lacked the capacity to oversee contractor performance due to limited expertise and workload demands.” On July 2, 2008, the Washington Post reported that more than 900 cases of contractors who allegedly defrauded taxpayers out of billions of dollars are languishing in a backlog built up over the past decade because the U.S. Department of Justice “cannot keep pace with the surge in charges brought by whistleblowers.”

The only way to provide adequate government oversight is to increase the size of the in-house federal workforce. Congress might have turned the corner last year with its passage of the 2009 National Defense
Authorization Act. Section 324 of that bill urges the Department of Homeland Security to “establish an aggressive plan to convert contract functions to in-house functions where appropriate.”

Beyond Section 324, a number of other things must happen. The government must eliminate federal personnel ceilings that have been politically imposed, determine the proper mix and roles of contractors and government employees, and ensure that a skilled and qualified workforce can be recruited, trained, developed, and retained. Bottom line: The government will not be able to control its use of contractors if it continues to impose arbitrary personnel ceilings at any level.

Converting positions from contractors back to government employees will not be easy and will run counter to the canard that measures the efficiency of government by the number of people it employs. The myth of smaller government in the face of hordes of private contractors and their spiraling costs must be debunked. The Obama administration should be honest with the American people by spelling out, once and for all, that it is not the number of government employees but rather the efficiency and effectiveness of government that really matters.

Base Budgets on Realistic Cost Estimates

The U.S. Department of Defense and the military services have historically underestimated the costs of new weapon programs. The result is cost growth, which is the increase from established baseline estimates to actual cost. In a study of 68 programs from the past 30 years, we found that, after adjusting for changes in the quantity of systems produced, costs grew by 46 percent on average over what had been estimated upon development approval (known as milestone B). We found no significant difference in cost growth from one decade to the next or from one military branch to the next. Only helicopters and space systems showed higher rates of cost growth than the overall average. This cost growth has remained high despite many acquisition reforms.

To examine why the cost estimates are consistently undershot, we narrowed our focus to 35 major weapon programs involving aircraft, missiles, electronics systems, launch vehicles, munitions, armored vehicles, and satellites. We focused on this smaller set of programs because of the labor-intensive nature of the work.

We found that total costs for the 35 programs grew an average of 60 percent beyond what had been estimated at milestone B. This higher average represents the growth when no adjustment is made for changes in the quantity of systems produced. But this higher rate of cost growth is less salient than its composition. We found that government decisions accounted for more than two-thirds of the cost growth, while estimation errors accounted for nearly a quarter (see Figure 2).

The most costly government decisions involved changes in requirements (usually for added performance and functionality), changes in the quantity of weapons ordered, and changes in schedules. The estimation errors included not just inaccurate cost and schedule estimates but also unforeseen problems that arose from technical difficulties.

Estimation errors can be made by the government, contractors, or subcontractors. Government analysts base their estimates on inputs from the defense department and contractors. Enormous pressure can be placed on the analysts to generate optimistic estimates so that certain programs might be approved. Estimation errors can thus result from incorrect cost data or models, inaccurate engineering estimates, or overoptimistic assumptions regarding the work, time, and resources required to develop the weapon systems.

We caution that isolating the causes of cost growth in major weapon programs is not an exact science. Our cost data are drawn from Selected Acquisition Reports, which are documents prepared at least annually for Congress by the defense department. Allocating the cost variances in these reports to one specific cause can be especially difficult. In many programs, a technical issue forces development to fall behind schedule. The contractor and a government official might then decide to change the weapon design to incorporate a different, more costly technical solution. The solution takes longer to implement, which extends the schedule further. Here, a technical issue results in cost growth and program delays that could be attributed to government decisions, because the decisions made did not necessarily have to be made. In such cases, it is not always possible to conclusively identify the source of a cost variance.

At such times, government managers, military leaders, and Congress should balance their efforts to
reduce cost growth between error-related causes and decision-related ones. A higher baseline cost estimate will align expectations with reality and indirectly reduce costs by diminishing the churn of program changes triggered by the common mismatch between plans and activities.

**Ensure Rigorous Oversight**

To deepen our understanding of what drives defective cost estimates, we conducted in-depth studies of two major space programs for the Space and Missile Systems Center of the U.S. Air Force. In both cases, we found that the government did not adequately guide and oversee the contractors. We also found the cost-estimation processes to be too closely tied to bureaucratic interests that held advocacy positions. We concluded that rigorous oversight, monitoring, and assessment of contractor costs, cost data, and technical designs throughout all phases of the proposal process and program execution are critical for developing credible cost estimates.

The first program we studied is the nation’s next-generation missile warning system, known as Space Based Infrared System—High (SBIRS High). The program links satellites in low earth orbits and geosynchronous earth orbits with infrared sensors on satellites in highly elliptical earth orbits. Lockheed Martin is the prime contractor; Northrup Grumman is the major subcontractor. The second program we studied is the Global Positioning System (GPS). The GPS prime contractor was originally Rockwell International, which was later acquired by Boeing.

Figure 3 summarizes the cost variances in both programs. Although SBIRS High had remarkably stable requirements from 1996 through 2005, it experienced cost growth of 300 to 350 percent over that time, when adjusted for quantity changes. Total cost variances amounted to more than $9.5 billion, with a net increase of $6.5 billion over the estimated cost at milestone B. All but $1 billion of that increase was attributable to estimation errors that had been made by the contractor and accepted by the government. The cost estimate has grown from $3.7 billion for five satellites to $10.2 billion for just three of those satellites, which are still in production.

GPS had a reputation as a well-managed program, but we found areas of concern. In 1996, the $7-billion program was intended to fund 78 satellites. In 2002, the requirement fell to 33 satellites, thanks to predecessor satellites that have remained operational longer than expected. The GPS program had an aggregate cost underrun, but most of that had to do with the sharply reduced quantity of satellites required. Meanwhile, significant components of the program experienced substantial cost growth, stemming in large part from cost-estimating errors.

Both programs suffered from an acquisition reform initiative ironically called Total System Performance Responsibility (TSPR). Begun in 1996 at the height of the Clinton administration’s implementation of several acquisition reform measures, TSPR requires that a contractor propose its own technical solution to meet high-level performance requirements; that the
The goal of acquisition reforms throughout the 1990s was to radically reduce the regulatory and oversight burden placed on industry. The catchphrase at the time was “insight, not oversight.”

contractor, with minimal government oversight, be responsible for implementing the solution; and that the contractor be relieved of what are assumed to be costly and cumbersome reporting requirements.

The goal of TSPR and other acquisition reforms throughout the 1990s was to radically reduce the regulatory and oversight burden placed on industry, under the assumption that this would save money. The catchphrase at the time was “insight, not oversight.” This was construed as invalidating the need for much of the documentation and reporting requirements of contractors, including their technical and cost data. Some government program managers interpreted these initiatives as orders, in effect, to abdicate their responsibility to monitor contractors.

Prior to TSPR, the level of oversight had been much more scrupulous. Government personnel typically attended tests and visited the plants of contractors and subcontractors to evaluate their facilities, personnel, and process controls. Design reviews were carried out in a formal structured way involving data packages, design analysis reports, risk analyses, and mitigation plans. The TSPR environment not only lacked this level of rigor for monitoring and assessing contractor capabilities but also served to rationalize the reduction of the federal workforce and its expertise.

The TSPR approach was bound to impair the ability of government officers to analyze the estimated costs and technical risks. The practical effects of such reforms also translated into heavy pressures on contractors to meet demanding performance requirements at much lower—often unrealistically low—cost, compared with what would have typically been thought possible in the past. The reformed acquisition process fueled overoptimistic estimates and eroded the government’s ability to oversee contractor activities in both the SBIRS High and GPS programs.

Simultaneously, a shift within the Space and Missile Systems Center to decentralize management of cost analysts and to place them in program offices had the effect of stripping many analysts of their independence from the program offices in which they worked. Because program offices are natural advocates for the systems that they are charged with developing, the cost analysts became advocates as well, introducing further conflicts of interest into the process. To make matters worse, there was an inadequate number of experienced analysts, a lack of relevant data to deal with space system complexities, insufficient coordination among cost analysts and engineers, and a lack of independent risk-assessment processes and methods.

All these factors contributed to an overreliance on contractors. We even found that a large portion of the government’s cost analysis itself had been outsourced to contractors, who appeared to carry out much of the day-to-day work of the Space and Missile Systems Center.

We offered the U.S. Air Force detailed recommendations, most of which have been adopted by the Space and Missile Systems Center. Such changes might also be needed for other federal programs that have been subjected to the acquisition reforms of the 1990s. Our key recommendations are as follows:

• Institute independent program reviews, with independent teams of experts working alongside cost estimators. The government agency’s chief engineer should review all assumptions.

• Place a special emphasis of the independent reviews on technical risk assessment, with the collection of more-relevant data and an increased visibility into contractor capabilities.

• Adopt an organizational structure that maximizes the independence of cost analysts who perform major cost estimates while retaining the specialized skills of decentralized analysts who understand the complexities of individual systems.

• Ensure that major estimates are led by experienced and qualified government analysts. The government’s approach to hiring, assigning, and promoting civil servants and military officers should be redesigned to attract and to retain first-rate cost analysts.

In the meantime, TSPR and other acquisition reforms of the 1990s that postulate savings without proof should be either abandoned or amended. They have inhibited government oversight of contractor performance and prevented the collection of needed cost and technical risk data.
Rethink Technical Requirements

For decades, the actual prices of acquiring U.S. military ships and fixed-wing aircraft have risen at nearly double the rate of inflation. This price growth is a different issue from the cost growth discussed earlier. Price growth is the increase in actual cost from one period to the next, thus representing the greater amounts of money paid for similar purchases over time. Such prices could rise because of the changing qualities and capabilities of the purchased items.

Prices of U.S. military ships and fixed-wing aircraft are now so high that they are outstripping the ability of the military services to pay them. Unless the services find some way to get more out of their budgets, price growth means that the size of the navy and air force will inevitably shrink.

Norman Augustine, a longtime aerospace industry executive, made a famous forecast in 1986 in reference to the soaring prices: “In the year 2054, the entire defense budget will purchase just one aircraft. This aircraft will have to be shared by the Air Force and the Navy three and one half days each per week except for leap year, when it will be made available to the Marines for the extra day.” His dire prediction of vanishing aircraft inventories could apply to ships as well.

About half the total price escalations for ships and fixed-wing aircraft stem from economy-driven factors that are beyond the control of the services. These factors—labor, material, equipment, and manufacturer fees and profits—have raised those prices at a steady rate roughly equal to or less than that of inflation over the past several decades. The other half of the price escalations stem from customer-driven factors, which are within the government’s control.

For every type of ship we examined—amphibious ships, surface combatants, attack submarines, and aircraft carriers—the price escalation rates ranged from 7 to 11 percent annually between 1950 and 2000. For every type of aircraft we examined—patrol, cargo, trainer, bomber, attack, fighter, and electronic warfare—the price escalation rates ranged from 7 to 12 percent annually between 1974 and 2005. These rates compare to an average annual inflation rate of 4.7 percent between 1965 and 2004 (see Figure 4).

The persistent price growth above the rate of inflation stems from the desire for greater capabilities. The navy has desired ever-more-complex ships: larger, faster, stealthier, more powerful, and with more mission and weapon systems. Other ship improvements in areas such as habitability, working conditions, and environmental regulations have contributed less to the increased prices. Likewise, the services have desired ever-more-complex aircraft. Figure 5 breaks down the composition of price growth from the F-15A fighter jet of 1975 to the F-22A of 2005. The figure shows that the aircraft’s complexity (lighter airframe material, faster maximum speed, greater stealth) contributed most to its price growth.

The navy could reduce the price of its ships by limiting their requirements or by building smaller, mission-focused ships rather than multimission ships. An alternative is to expand the use of modular weapon

Figure 4—For Every Type of Ship and Aircraft Examined, the Cost Escalation Rate Exceeded That of Inflation

<table>
<thead>
<tr>
<th>Ships</th>
<th>Average annual percentage cost escalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibious ships</td>
<td>10.8</td>
</tr>
<tr>
<td>Surface combatants</td>
<td>10.7</td>
</tr>
<tr>
<td>Attack submarines</td>
<td>9.8</td>
</tr>
<tr>
<td>Aircraft carriers</td>
<td>7.4</td>
</tr>
<tr>
<td>Patrol</td>
<td>11.6</td>
</tr>
<tr>
<td>Cargo</td>
<td>10.8</td>
</tr>
<tr>
<td>Trainer</td>
<td>9.1</td>
</tr>
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<td>Bomber</td>
<td>8.4</td>
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<tr>
<td>Attack</td>
<td>8.3</td>
</tr>
<tr>
<td>Fighter</td>
<td>7.6</td>
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<tr>
<td>Electronic</td>
<td>6.7</td>
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<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Average annual inflation rate (4.7 percent)</th>
</tr>
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<tbody>
<tr>
<td>Ships</td>
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</tr>
<tr>
<td>Amphibious ships</td>
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<td>Electronic</td>
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systems, thereby reducing the total number of mission packages across the fleet. Yet another option is to buy a mix of ships: some specialized to a particular mission and others that could serve multiple roles. It appears the navy is now pursuing such a strategy. The federal government could also use longer-term, multiyear contracts to encourage greater efficiencies among contractors. A combination of such efforts might be most appropriate.

There are several options to reduce the price of aircraft as well, but none of them is a panacea. Longer-term contracts could again encourage manufacturers to increase efficiencies. Fewer change orders might reduce prices. The services could curb the growth in technical requirements by focusing on incremental improvements over successive generations of aircraft, but this approach could slow the pace of innovation and risk losing an edge over potential competitors.

To stay within budget, the services appear to be opting for fewer aircraft but with the greatest capabilities. Such a strategy helps ensure that U.S. aircraft remain far superior to those of any other military in the world, but this comes at a price. When budgets were larger and growing, the price increases were not a problem. Now, with tighter and potentially diminishing budgets, the nation needs to make harder choices between the capabilities and the number of fixed-wing aircraft.

### Consider Hiring More Shipyard Workers

Of the $4 billion spent by the navy each year for ship maintenance, about $3 billion of the work occurs at four public shipyards. They are located in Portsmouth, Virginia; Kittery, Maine; Bremerton, Washington; and Pearl Harbor, Hawaii. These shipyards employ more than 25,000 civilians.

The navy’s staffing plan for the four shipyards would be a cost-effective strategy for meeting their planned work. The problem, however, is that the planned workload forecasts have consistently underestimated the actual workload demands.

To compensate for underestimated demand, the shipyards have used overtime to an extent that diminishes productivity. We do not propose eliminating overtime altogether. We find that average annual overtime of 9–18 percent above a full-time schedule is a cost-effective strategy. But overtime beyond those levels can result in large decreases in worker productivity, mostly due to fatigue. High and sustained levels of overtime can also pose safety risks.

In addition to overtime, the shipyards have resorted to using temporary, seasonal, and borrowed labor, but none of these alternatives is as productive as resident, permanent labor working standard hours (known as “straight time”). An increase in the resident, permanent labor force could help the navy be more productive and hedge against the costs of workload growth.

The table shows the costs associated with different workforce and workload scenarios. Under current plans (shown in the first row), the navy will have an average available force of 13,800 workers per day to fill an average demand for 15,485 man-days per day through 2013. The shortfall would be met by overtime that averages 13 percent of straight time and peaks at 19 percent. This scenario, involving no unplanned work, would cost the navy $2.8 billion per year. There is nothing wrong with this scenario and this amount of overtime, assuming all goes as planned.

The second row of the table shows the overtime and cost implications of a workforce that is not increased to manage a workload that grows by 6 percent. In this case, the navy has 13,800 workers to perform 16,433 man-days of work. Here, the navy would use overtime that averages 20 percent of straight time and peaks at 28 percent. This second scenario would raise the average annual cost from $2.8 billion to $3.2 billion. This is an increase of about 14 percent. Note that with the navy’s planned staffing levels, a 6-percent increase in workload results in a 14-percent increase in cost. The primary reason is that the costly overtime must increase substantially.
The third and fourth rows show how expanding the permanent workforce would hedge against the costs of unanticipated workload growth. The third row shows increases in both the workforce and the workload. Should the navy increase its workforce by 5 percent (to 14,500 workers), the expanded workload would cost only $3 billion. This is because overtime would drop to just 11 percent on average and peak at no more than 18 percent. The 700 additional workers would cut the average annual overtime from 20 percent to 11 percent, nearly halving the additional cost of doing 6 percent more work. Therefore, a cost avoidance can be realized by hiring more workers.

Perhaps most important, hedging against workload growth would cost the navy virtually nothing even if the workload does not grow. As the fourth row of the table shows, should the workforce grow above current forecasts but workload demand not materialize, executing the workload with higher workforce levels would still cost the navy only $2.8 billion. This is because with more workers, the shipyards could use less overtime to accomplish their current, planned workload.

In all cases, the minimum cost strategy is to increase the workforce. This example underscores that it is not the size of the government workforce that matters most, but rather the efficiency and effectiveness of government work. ■

**Related Reading**


### Expanding the Shipyard Workforce Would Save Money If the Workload Grows and Cost Virtually Nothing If It Does Not

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Average Available Force (men per day)</th>
<th>Average Workload (man-days)</th>
<th>Average Overtime (percentage)</th>
<th>Peak Overtime (percentage)</th>
<th>Average Annual Cost (in billions)</th>
</tr>
</thead>
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<tr>
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<td>15,485</td>
<td>13</td>
<td>19</td>
<td>$2.8</td>
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<td>16,433</td>
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<td>$3.2</td>
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<td>Expand the workforce and the workload above the plan</td>
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<td>16,433</td>
<td>11</td>
<td>18</td>
<td>$3.0</td>
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<td>14,500</td>
<td>15,485</td>
<td>9</td>
<td>17</td>
<td>$2.8</td>
</tr>
</tbody>
</table>


*NOTE: Costs are in U.S. dollars for fiscal year 2007.*
Bridge the Gulf
To Advance Negotiations with Iran, Cede Conventional Wisdom

By Frederic Wehrey

Frederic Wehrey is a RAND adjunct senior policy analyst and a specialist in Persian Gulf security issues. For the past three years, his field research in the Middle East has focused on local perceptions of Iranian influence, political reform in the Gulf, and the regional impact of the Iraq war. He is currently a doctoral candidate in international relations at the University of Oxford, St. Antony’s College.

On March 20, 2009, at the start of the Persian New Year, U.S. President Barack Obama sent the people and leaders of Iran a videotaped message to hail a “new beginning” of “pursuing constructive ties” between the two nations. But for the United States to deliver on this promise, and for Iran to overcome its suspicions of America, U.S. policymakers will need a clearer understanding of Iran’s political complexity, regional influence, and negotiating culture. Only then will diplomatic overtures, grounded in reality, stand a fair chance of success.

Much has been made of the upcoming June 12 presidential election in Iran as a possible turning point in Iran’s relations with the West. Yet the winner of this contest, regardless of his political leaning, will have to operate within the system of checks and balances that defines Iran’s political system. Contrary to popular assumption, ultimate political power in Iran rests not with the Office of the Presidency but with the Office of the Supreme Leader, or rahbar, who mediates over an array of competing factions and government structures.

The current supreme leader, Ayatollah Ali Khamenei, has long evinced a sense of confidence about Iran’s regional standing, a fundamental distrust of U.S. motives, and a dedication to preserving Iranian sovereignty, all of which may make compromise with Tehran difficult. Moreover, factional struggles and bureaucratic interests within Iran’s political system make the country’s nuclear ambitions less sensitive to external pressure than is commonly recognized. Popular support for nuclear enrichment complicates matters further.

Closely tied to Khamenei is the 125,000-member Islamic Revolutionary Guard Corps, which has seen its profile in Iran’s politics, economy, and society expand dramatically over the past decade. Yet the Guard Corps is hardly monolithic in its political outlook, and the twin poles of commonly held assumptions about this institution are both incorrect: It is neither a corrupt gang nor a firebrand’s vanguard aiming to export Iran’s revolution across the region. Rather, its vested and expanding interests in the Iranian economy may, over the long term, make it an increasingly pragmatic force, as opposed to an ideological one.

Outside the domestic realm, U.S. policy must be grounded in a more sober appraisal of the extent and limitations of Iran’s influence in the region. The notion of constructing a bloc-like containment of Iran, centered on Saudi Arabia as an Arab counterweight to Iran, is increasingly unrealistic. The key driver in dealings between Saudi Arabia and Iran is not the...
Sunni-Shia religious divide or even ethnic Arab-Persian distinctions, but rather a calculated appraisal of geopolitical influence and economic self-interest. Given their geographic proximity and the impending U.S. drawdown in Iraq, the two countries may find that their interests increasingly intersect.

In approaching Iran, U.S. diplomats should be mindful that Iranians have unique negotiating attributes. Among them are a pronounced sense of victimization and a tendency to revisit issues that both sides previously agreed were closed. Yet there is value in negotiating with Iran, even if the likelihood of a breakthrough is remote. Negotiations can broaden U.S. contacts inside the regime, reduce misunderstandings that can escalate into conflict, and demystify a country that is widely misunderstood.

**Supreme Leadership**

Lacking the charisma of his predecessor, Ayatollah Ruhollah Khomeini, the current Supreme Leader Khamenei is often overlooked and considered a weak personality, but he is Iran’s highest political authority. Much of his formal power is exerted indirectly—through appointment and oversight roles over legislative and military institutions—but the informal realm is where U.S. policymakers should focus their attention. Khamenei exerts influence through his mediating role over competing factions, his personal relationships with top military commanders, and his special representatives throughout Iran’s key security, diplomatic, and religious institutions.

Since Iranian President Mahmoud Ahmadinejad’s 2005 election, Khamenei’s influence has grown, largely as a result of his ability to use Ahmadinejad to press unpopular agendas while expending no political capital of his own. Khamenei has also been buoyed by nationalist pride. Iran’s recent gains in the wake of the U.S.-led invasion of Iraq, the 2006 Lebanon war, and the ongoing strife in Gaza have caused Khamenei to enjoy a sense of strategic confidence—the belief that there is a “new Middle East” tilted squarely in favor of the Islamic Republic of Iran.

In tandem with this outlook, Khamenei’s ambivalence about U.S. motives and his commitment to Iranian sovereignty inform his approach to negotiations. In his mind, incremental compromises may be perceived as signs of weakness, threatening the steady erosion of Iranian sovereignty. Throughout his speeches, the promotion of justice and the safeguarding of Islam worldwide are frequently cited as the transcendent goals of the Islamic Revolution. Yet to pursue these, Iran must be politically independent, which in turn hinges on economic and technological self-sufficiency, hence the overriding importance of an indigenous nuclear fuel cycle.

Oil has not brought Iran economic self-sufficiency. Oil exports made up nearly a third of Iranian government revenues and 85 percent of total export earnings in 2007, according to the U.S. Department of Energy, but this reliance on a single resource has hindered growth in the remainder of the economy. Meanwhile, government interference in the economy has deterred
foreign direct investment in oil, gas, and other economic sectors. As a result, the Iranian economy has not grown to its potential and remains plagued with high inflation, unemployment, and other ills.

Such economic pressures might encourage those who deride Ahmadinejad for his posturing on the nuclear program, but internal bureaucratic interests and popular support for nuclear enrichment make the Iranian nuclear issue more intractable than is commonly assumed. The Iranian government’s success in branding its nuclear-enrichment program as a symbol of national sovereignty also now limits its ability to make concessions on that issue, were it so inclined.

The strongest supporters of Iran’s nuclear drive are those who stand to lose the most from its termination. Foremost among these is the nation’s Atomic Energy Organization, which oversees the program. Another is the Islamic Revolutionary Guard Corps, which provides security for all nuclear-related installations and, given its role as custodian of Iran’s ballistic missile arsenal, would likely exert command and control over any nuclear weapons.

**Pasdaran Rising**

Known as the Pasdaran (Persian for “guards”), the Islamic Revolutionary Guard Corps has evolved far beyond its original foundation as the guardian of the Islamic Revolution. Today, the corps functions as an expansive sociopolitical-economic conglomerate whose influence extends into virtually every corner of Iranian society and political life.

Founded by the Ayatollah Khomeini in 1979, the Pasdaran still constitute the nation’s elite military armed force, comprising ground troops as well as naval and air assets. The Pasdaran are second in size only to the regular military, the Artesh, which receives fewer resources. The Pasdaran have also gained power in Iran’s highly factionalized political system, in which the president, much of the cabinet, many members of parliament, and a range of other provincial and local administrators hail from their ranks. The Pasdaran oversee a robust apparatus of media resources, training activities, and education programs designed to bolster loyalty to the regime and prepare the citizenry for homeland defense.

But it is in the economic sphere that the Pasdaran have seen the greatest growth and diversification. Industries and commercial services ranging from dam and pipeline construction to automobile manufacturing, real estate, pharmaceuticals, and laser eye surgery have fallen under their sway, along with a number of illicit smuggling and black-market enterprises. With this vast involvement in Iran’s economy, some factions of the Pasdaran may act as a moderating force if they perceive threats to their vested commercial interests.

U.S. policymakers should be mindful that the Pasdaran are prone to the same rivalries found throughout Iranian politics, pitting traditionalists, reformists, and others against one another. President Ahmadinejad was widely viewed as having the support of the Pasdaran when he was elected in 2005, having been a former member, yet much of his support actually came from poorer members of the Basij, a paramilitary force under Pasdaran control. More recently, sharp criticism of his tenure has emerged from powerful veterans of the Pasdaran, making his reelection in June far from certain. What is certain, however, is that any successor to Ahmadinejad must contend with the Pasdaran as a deeply entrenched institution and a powerful constituency.

**The False Hope of Containment**

In formulating a regional strategy toward Tehran, Washington has thus far adopted the outlines of a Cold War–style containment approach. This may rest partly on the presumption that the Sunni-Shia religious divide and other tensions naturally place Sunni Arab Gulf countries on one side of the equation and Shia Persian Iran on the other. The hope is that a bloc of moderate Arab states, led by Saudi Arabia, can check Iranian influence in the region.

Saudi Arabia, viewing Iran as a contender for symbolic leadership in the Middle East since the fall of Saddam Hussein in 2003, has indeed tried to paint Iran as an aberration from the rest of the region. The most expeditious means of doing so has been to cast the Islamic Republic’s Shia ambitions as a threat to Sunnis everywhere. But the more fundamental disagreement between Saudi Arabia and Iran is over the regional balance of power and the role of the United States. The notion of a bloc of Gulf states opposing Iran is even more unrealistic given the doubts within those states about Saudi leadership, the disunity within the Gulf Cooperation Council, and, in particular, the tendency of Qatar and Oman to go it alone.
Meanwhile, Saudi Arabia and Iran are showing their ability to reach an accommodation on regional order while minimizing deeper ideological and structural tensions. Iran has made overtures to Saudi Arabia about a sort of cooperative power-sharing relationship over Iraq that may mirror past coordination on Lebanon but that explicitly calls for the departure of U.S. forces. Riyadh likely sees this overture for what it is: an attempt to deprive Saudi Arabia of its external patron and relegate it to the status of junior partner in the new regional order. Instead of true cooperation, the Saudi-Iranian relationship over Iraq is likely to be defined as “managed rivalry,” with a modicum of coordination and contact to prevent an escalation of sectarian conflict, which would benefit neither side.

Because the Saudi leadership has a tendency to engage with Iran, U.S. policymakers should view Saudi Arabia less as a bulwark against Iran and more as an interlocutor. The United States should seek Saudi-Iranian endorsement of multilateral security for the Gulf. Such an arrangement would recognize Iran as a valid player but assuage Saudi and Gulf concerns about Iranian dominance. A conflict-regulating system, akin to the Organization for Security and Cooperation in Europe, bears further consideration in this regard. Cooperation in the maritime area would be a useful focus for such a forum, particularly given the potential for miscalculation and escalation in critical waterways, such as the Strait of Hormuz.

**Diplomatic Windows**

Negotiating with Iran poses a major challenge to the United States, but it should be done. America’s long aversion to discussions with Iran has squandered several opportunities to reduce tension: most notably in 2001, on the margins of the Bonn talks on Afghanistan, and in 2003, on the eve of the invasion of Iraq. In both cases, Iran came to the table because of gratitude and fear, two motives that may be absent today and instead replaced by a newfound sense of confidence and the perception of diminished U.S. credibility in the region.

Iran has good reason to fear external meddling in its internal affairs, given the long pattern of interference by Western powers, of which the most notorious is the 1953 coup against Prime Minister Mohammed Mossadegh. Western diplomats who try to strike a deal with Iranians should not be surprised if the Iranians seem obsessed with being cheated and exploited by others.

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An Iranian sense of historical and current victimization is just one of the characteristics that shapes the Iranian approach to negotiating. Others include a tendency to reopen issues that both sides thought had been resolved, an avoidance of incrementalism, a tendency to defer the resolution of weighty issues, a need to affirm that concessions to their demands have been earned, and a myopic focus on maximizing short-term gains to the detriment of long-term advantage.

In other ways, however, the Iranian diplomatic landscape is hardly unique, exotic, or exceptional. Just like citizens in other states, Iranians are engaged in a set of debates about issues both profound and mundane: sovereignty, identity, modernity, economic privilege, and political power. A successful U.S. strategy toward Iran might just hinge on a more humble understanding of the country’s complexity and a more sober recognition of its normalcy.

**Related Reading**


Once, a Man Straddled Two Worlds

In Memoriam—Jeremy Azrael

By James A. Thomson

James Thomson is president and chief executive officer of the RAND Corporation.

When he died at age 73 on March 19, 2009, Jeremy Azrael was wearing several hats. Director of the RAND Center for Russia and Eurasia. Director of the RAND Business Leaders Forum. Holder of a RAND Corporate Chair. He also was the first person to receive a RAND Medal for Excellence, which recognizes those who develop something completely new at RAND.

As a student at Harvard University, Jeremy was among the first American graduate students admitted to study in the Soviet Union under the first exchange agreement signed in 1958. He began building a network within the country during this period, and he was at one time declared “persona non grata” by Soviet authorities.

His RAND innovation sprang from those experiences. In the early 1990s, in the wake of the collapse of the Soviet Union and the end of the Cold War, he had the astounding idea that post-Soviet Russia should become a RAND client. This would be good for Russia and good for RAND’s domestic policy researchers and Soviet specialists, the latter of whose traditional sponsorship had vanished. I bought the idea, no matter how nutty it seemed at the time.

While Jeremy’s original idea did not bear fruit, a companion idea of his did: a Russian-American business leaders forum wherein business executives from both countries could exchange views on mutual challenges. RAND could charge for attendance, Jeremy suggested, and use the proceeds to pay for the forum and for a program of research related to Russia.

We weren’t sure if this would work. It was unclear whether the Americans would show up. The same went for Russian business executives, who at that time had little love for one another and were not wild about airing dirty laundry in front of Americans. But, as one Russian business executive told me, “The only person who can get us Russians in the same room is Jeremy Azrael.”

In the early years, there were several times when we thought we would lose Jeremy, ten years before we actually did. Before and during the meetings, he would be wound tighter than a watch—pacing, smoking, swilling coffee, and in the evening stronger stuff, speaking Russian and English on his cell phone constantly.

That Jeremy succeeded is testament to his entrepreneurial spirit, keen sense for interpersonal relations, and talent for organization and detail. He was a serious scholar of the Soviet Union’s ethnic and national minorities and of the challenges they posed to the state’s leadership.

He began his relationship with RAND as a consultant in 1961 and became a full-time employee in 1974, only to leave a few years later to serve as the CIA’s National Intelligence Officer At-Large and then as Secretary of State George Shultz’s senior adviser on Soviet affairs. He returned to RAND in 1985, just as Mikhail Gorbachev was coming to power. The political changes under Gorbachev permitted Jeremy to return to the USSR for the first time in many years. He was able to reestablish numerous personal relations cut off by the time he spent in government.

The RAND Business Leaders Forum continues to this day, meeting twice a year. It has been a remarkable achievement, and it is hard to think of a single figure in the world of international security, diplomacy, or business with substantial dealings in Russia who has not attended.

Jeremy Azrael made a major contribution to Russian-American relations and to the emergence of a more civilized global society. As one forum member told me, “The best way to erect the monument to Jeremy [that] he deserves would be to continue with the tradition of the RAND Business Leaders Forum.”

We intend to erect that monument. As this issue is being distributed, we will be convening the next meeting of the forum in New York City.
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—Younes Nazarian (right), a member of the RAND Center for Middle East Public Policy advisory board, is a philanthropist, industrialist, businessman, and leader in the Persian Jewish community in Los Angeles and Tel Aviv. Soraya Nazarian, a sculptor, studied art at the University of Judaism and in Italy. She draws upon her experiences of motherhood, family, spirituality, and Persian culture as her inspirations.

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