ISSUES OVER THE HORIZON

Eleven Emerging Challenges

The Aging Couple • Corporate America’s Next Big Scandal • Innovative Infrastructure • When Electronic Voting Machines Fail • Reality Check for Defense Spending • A New Anti-American Coalition • The Future of Diplomacy • Corporate Counterinsurgency • Beating the Germ Insurgency • A Second Reproductive Revolution • From Nation-State to Nexus-State
An Antidote to Breaking News

In this era of immediacy, with its 24-hour news outlets dependent on “breaking news” and the swiftest and shrillest reactions to it, there is an old-fashioned charm in taking a step back, methodically uncovering the long-emergent patterns, and projecting where they might lead us well beyond the next few news cycles.

This issue of RAND Review salutes the unfashionable approach, first by paying homage to a man who foresaw much about today’s world more than 40 years ago and then by sharing the prognostications of those who aim to follow in his footsteps. Our opening story introduces you to Willis Ware and others who have upheld his tradition. The 11 “issues over the horizon” essays then identify current trends as harbingers of upcoming events, bringing to light several simmering but overlooked challenges and opportunities.

In a similar way, our story on the invisible wounds of war removes the veil from age-old scourges of combat and warns that they will haunt us for years to come. But this story, too, contains a message of hope, because wounds such as these must be exposed before they can become mended.

This entire issue of RAND Review offers the opposite of “breaking” news, the definition of which denotes interruption, disruption, and destruction. In marked contrast, this issue offers “mending” news and its promise: continuation, correction, and restoration.

—John Godges

On the Cover
Rays of light pierce through storm clouds on June 10, 2008, south of Palco, Kansas.
AP IMAGES/HAYS DAILY NEWS, STEVEN HAUSLER
RAND—Then, Now, and Tomorrow

Time Travelers
A Storied Tradition of Peering into the Future

RAND IS KNOWN MOSTLY for influential studies that address pressing policy issues. But RAND also has a history of thinking broadly about what the future holds. Such what-if thinking isn’t about predicting the future; it’s about building on a foundation of present knowledge and extrapolating from it to envision the future implications.

From Calculator to Computer
“The computer will touch men everywhere and in every way, almost on a minute-to-minute basis. Every man will communicate through a computer whatever he does. It will change and reshape his life, modify his career, and force him to accept a life of continuous change.”

Not that profound today, but when electrical engineer Willis Ware wrote these words at RAND in 1966, computers were still the esoteric playthings of scientists and so large they took up entire rooms. In a series of papers in the 1960s, Ware built his case for the future of computers from the ground up, laying down the logical underpinnings from what was then known. On that basis, he predicted—with stunning prescience—that, for example, personal computing services would emerge, and “a small computer may conceivably become another appliance” in the home.

More broadly, he speculated on the uses of computers in business, education, health care, criminal justice, communications, and research—uses that we all take for granted today. He also began to ponder computer issues that bedevil us today: “With so much available information around,” he warned four decades ago, “we may encounter an invasion of privacy problem.”

From Wired to Connected
The information revolution that Ware foresaw is upon us, and RAND researchers have continued to look at what lies ahead as a result. In pioneering work that began in the 1990s, political scientist David Ronfeldt argued that the information revolution was leading to the rise of network forms of organization, with extraordinary implications for how societies are organized and conflicts are conducted. He charted four evolutionary phases of social organization—first tribes, then hierarchical institutions, then markets, and now networks—recognizing that all four operate concurrently today.

From that theoretical basis, in 1996 he and RAND colleague John Arquilla foresaw, with eerie accuracy, the near-term rise of terrorist groups that would organize themselves less as tight-knit hierarchies than as sprawling networks that would employ “swarming” strategies characteristic of “netwar.” The world knows what happened five years later.

In more encouraging terms, Ronfeldt in 2002 pointed to the long-term emergence of a new, network-based realm of governance. “Over the long term (decades), new policymaking mechanisms will evolve for joint communication, coordination, and collaboration among government, business, and civil-society actors. Today, it is often said that ‘government’ or ‘the market’ is the solution. In time, it may well be said that ‘the network’ is the solution.”

From 2006 to 2020
Information technology might lead us down the path foreseen by Ronfeldt, but a number of other technologies—biotechnology, nanotechnology, and materials technology—will also have a direct impact on the future. How will these trends play out worldwide?

In 2006, a RAND research team led by physicist Richard Silberglitt looked at 29 countries across the spectrum of scientific advancement (from low to high) and assessed their abilities to implement 16 key technology applications by 2020. Among the applications considered were wearable computers, pervasive sensor networks, tissues grown to replace human body parts, vastly improved surgical procedures, cheap solar energy, rural wireless communications, and genetically modified crops.
“Scientifically advanced countries—such as the United States, Germany, and Japan—will be able to implement all key technology applications,” the team concluded. “But countries that are not scientifically advanced will have to develop significant capacity and motivation before barriers to technology implementation can be overcome.”

Harkening back to Ware, the team noted that controversial issues inherent in certain technologies would engender public debate and strongly influence technology implementation. For example, radio-frequency identification tagging had already raised privacy concerns.

Institutionalizing the Idiosyncratic

While such what-if thinking has always thrived in the RAND environment, it has been idiosyncratic, driven either by the inclinations of researchers or by the particular needs of projects. However, starting in 2001—with the establishment of the RAND Frederick S. Pardee Center for Longer Range Global Policy and the Future Human Condition—RAND began to “institutionalize the idiosyncratic.”

The RAND Pardee Center aims to enhance the overall future quality and condition of human life by aggressively disseminating and applying new methods for long-term policy analysis in a wide variety of policy areas in which the methods are needed most.

Whether it is global warming, genetic engineering, or sustainable growth, the Pardee Center is premised on the idea that many of today’s choices will significantly influence the course of the 21st century. Using new approaches to computer-aided what-if thinking and policy design, the center’s researchers seek to examine a vast range of plausible futures and to craft near-term, often adaptive, strategies that can succeed reasonably well across a wide array of possible future scenarios. In other words, the researchers have shifted the question from “What will the future bring?” to “How can we act today to be consistent with our future interests?”

Pardee Center researchers argue that their new analytic methods, enabled by the same modern computers foreseen decades earlier, could transform our ability to reason systematically about the long-term future. Indeed, Ware made this point more than 40 years ago, when he declared: “The computer will be the most important tool ever available for the conduct of research.”

Related Reading

- The Computer in Your Future, Willis H. Ware, RAND/P-3626, 1967, 47 pp., $23.
- Future Computer Technology and Its Impact, Willis H. Ware, RAND/P-3279, 1966, 29 pp., $20.

It isn’t about predicting the future; it’s about building on a foundation of present knowledge and extrapolating from it to envision the future implications.
Stop Loss

A Nation Weighs the Tangible Consequences of Invisible Combat Wounds

By Terri Tanielian, Lisa H. Jaycox, and the Invisible Wounds Study Team

Terri Tanielian is codirector of the RAND Center for Military Health Policy Research and deputy director for public health preparedness at the RAND Center for Domestic and International Health Security. Lisa Jaycox is a senior behavioral scientist and clinical psychologist at RAND. Tanielian and Jaycox led a team of more than 30 RAND researchers who studied the invisible wounds of war. Reports from their work can be found at http://veterans.rand.org.

Since late 2001, about 1.64 million U.S. troops have been deployed to Afghanistan or Iraq. Public concern about the care of the war wounded is high. Several task forces, independent review groups, and a presidential commission have investigated this care and recommended improvements. Policy changes and funding shifts are under way.

However, the impetus for policy change has outpaced the knowledge needed to inform it. Large gaps remain in our understanding of the prevalence of mental health and cognitive conditions among returning U.S. servicemembers, the costs of these conditions, and the care systems available to treat the conditions.

To begin closing the gaps in understanding, we studied three conditions: post-traumatic stress disorder (PTSD), major depression, and traumatic brain injury (TBI). PTSD is often triggered by exposure to traumatic or life-threatening events, such as combat. Major depression is often linked to grief and loss, which can be salient for servicemembers who have lost their comrades. TBI refers to any physical brain injury, ranging from a mild concussion to a penetrating head wound.

Unlike strictly physical wounds, these conditions affect mood, thoughts, and behavior and often remain invisible to other servicemembers, to family, and to society. Symptoms of these conditions, especially PTSD and major depression, can have a delayed onset, appearing months after exposure to the causative stress. The effects of TBI are particularly unclear, leaving us uncertain about its extent and how to address it.

Based on a survey we conducted of veterans who have returned from Afghanistan or Iraq, we estimate that more than 300,000 veterans—or 18.5 percent of those deployed since 2001—now have PTSD or major depression. A partially overlapping 19.5 percent—nearly 320,000 individuals—suffered a probable TBI while deployed. Figures 1 and 2 break down the estimated prevalence rates among those who currently have PTSD or major depression, those who experienced a TBI while on duty, and those who have endured both a TBI during deployment and PTSD or major depression following deployment.

By our calculations, the 300,000 PTSD and major depression cases have already cost the nation up to $6.2 billion in just the first two years following deployments. The additional cost of the documented TBI cases, a small fraction of all probable TBI cases, could exceed $900 million in just the first year following deployments.
Only about half of veterans who currently need treatment for these conditions seek it, and just 30 percent of those in need of treatment receive minimally adequate care. Yet expanding access to high-quality care can save money while improving recovery rates. Investing in high-quality treatment for PTSD and major depression could save more than $1,000 per returning veteran (wounded or not) in just the first two years following deployment by substantially reducing the costs of lost productivity and suicide.

With political will galvanized to improve care for the mental health and cognitive conditions of returning U.S. servicemembers, there is now an historic opportunity for transformation. But the magnitude of the challenge should not be underestimated.

**Extraordinary Conditions**

Stress has been a fact of combat since the beginning of warfare. However, the current conflicts share three unique features pertaining to the stress levels placed on the force: extended deployments, the proliferation of improvised explosive devices, and higher survival rates among the wounded.

The pace of deployments in Iraq and Afghanistan is unprecedented in the history of the all-volunteer force. Not only is a higher proportion of the armed forces being deployed, but the deployments have been longer, redeployment to combat has been common, and breaks between deployments have been infrequent. Many troops have been exposed for prolonged periods to combat-related stress or traumatic events. Some commonly identified current stressors are improvised explosive devices, roadside bombs, suicide bombers, the handling of human remains, killing an enemy, seeing fellow soldiers and friends dead or injured, and the helplessness of not being able to stop violent situations.

The current conflicts have also witnessed the highest ratio of wounded to killed in action in U.S. history. Advances in medical technology and body armor have allowed more servicemembers to survive experiences that would have led to death in prior wars. Consequently, casualties of a different sort—those with invisible wounds—have begun to emerge.

In our survey of a nationally representative sample of recently returned servicemembers, we found high reporting levels of nearly 50 percent for many traumatic events. Vicariously experienced traumas, such as having a friend be killed or seriously wounded, were the most frequently reported (see Figure 3).

A total of 1,965 individuals participated in our survey. Unlike other surveys of veterans returning from Iraq or Afghanistan, our survey drew from the population of all those who have been deployed, regardless of service branch, active or reserve component, or unit type. Ours also guaranteed confidentiality because our survey data cannot be linked to any individual’s government personnel records.

Among the estimated 300,000 recently returned veterans who now have PTSD or major depression,
we estimate that 226,000 are afflicted with PTSD, that 225,000 have major depression, and that nearly 150,000 are currently afflicted with both disorders. To measure the rate of exposure to a probable TBI during deployment, we asked veterans a series of questions to determine if they had experienced any combat-related injury resulting in an alteration of consciousness immediately following the injury—such as being confused, experiencing memory loss, or being unconscious. Of the estimated 320,000 veterans who reported having experienced a probable TBI during deployment, most (about 200,000) do not have a current mental health disorder, while the remaining 120,000 also met criteria for PTSD, major depression, or both.

The rates of PTSD and major depression are highest among U.S. Army and U.S. Marine Corps veterans, who have borne the brunt of the recent conflicts; among those who are no longer on active duty (those in the National Guard or National Reserve and those who have left the military); and among women, Latinos, and enlisted personnel. However, the single best predictor of PTSD and depression among all groups of servicemembers is exposure to combat trauma while deployed.

The need for mental health services for servicemembers deployed to Iraq or Afghanistan will likely increase over the years and decades to come, given the recent large increases among Vietnam and Gulf War veterans who are using mental health services, likely reflecting the lifetime recurrence of mental health problems and legitimate need. Policymakers may therefore consider the numbers presented here to underestimate the burden that PTSD, major depression, and TBI will impose now and in the future.

Costly Consequences

Left untreated, PTSD, major depression, and TBI can have far-reaching, damaging, and costly consequences. Individuals with these conditions tend to miss more days of work, report being less productive while at work, and are more likely to be unemployed. The presence of any of these conditions predicts a greater likelihood that an individual will experience other psychiatric problems, such as substance abuse. All three conditions increase an individual’s risk for attempting suicide. All three have been associated with higher rates of unhealthy behaviors—such as smoking, overeating, and unsafe sex—higher rates of physical health problems, and higher mortality rates. There is also a possible link between these conditions and homelessness.

Populations with high rates of PTSD, major depression, or TBI are likely to demonstrate high rates of family difficulties as well. Each disorder accounts for a greatly increased risk of distressed relationships, domestic violence, and divorce among the afflicted. The interpersonal deficits that interfere with emotional intimacy
But because reliable data are unavailable to quantify many of these costs, we are able to factor in only the treatment cost, lost productivity (including reduced employment and lower earnings), and the cost of lives lost to suicide. (We ascribe a value of $7.5 million to each “statistical life” lost to suicide. A statistical life represents a hypothetical individual who might be saved by a particular intervention or policy change.)

Using a mathematical model to estimate the costs of PTSD and major depression, we first compute the total two-year costs of treatment, lost productivity, and suicide among a prototypical population of servicemen who returned home from Iraq or Afghanistan in 2005. We then derive the average two-year costs per case of PTSD, major depression, and comorbid PTSD and major depression in this population. Based on these average costs per case, we then extrapolate the two-year costs incurred for these conditions among all servicemen who have returned from Iraq or Afghanistan since 2001.

We limit our time horizon to two years because we do not have enough information either to break down costs or to project the course of remission and relapse over a longer time frame. This calculation thus omits the costs of any chronic or recurring cases that linger beyond two years.

On a cost-per-case basis, the estimated two-year cost for each case of PTSD alone ranges from $5,900 to $10,300; for each case of major depression alone, from $15,460 to $25,760; and for each case of comorbid PTSD and major depression, from $12,430 to $16,890 (see Figure 4). The cost for comorbid PTSD and major depression is lower than the cost for major depression alone because individuals who develop late-onset comorbid PTSD and depression do not become sick until near the end of our two-year time horizon. (Depression does not develop as a late-onset illness unless coupled with PTSD).

In all cases, the low estimates exclude the cost of lives lost to suicide, whereas the high estimates include this cost. Although the cost of a completed suicide is extremely high, the probability of committing suicide—even among those with a mental disorder—is very low. As a result, the estimates can vary widely depending on the expected number of suicides. Because of the high degree of uncertainty regarding the number of completed suicides that might occur as a result of PTSD or major depression, we consistently present results with and without the costs associated with lives lost to suicide.
Applying the per-case costs to the entire population of 1.6 million veterans who have returned from Iraq or Afghanistan since 2001, we estimate that PTSD and major depression have cost the nation between $4 billion and $6.2 billion in just the first two years following deployments, depending on whether we account for the lives lost to suicide.

Savings Opportunities

We also predict the likely costs and savings that would result from treating more of those in need and improving their care. We begin with the following key assumptions about the treatment “status quo”: Only 30 percent of individuals with PTSD or major depression receive treatment, and only 30 percent of those in treatment receive evidence-based care (medical care to which evidence gained from the scientific method has been applied). These assumptions are drawn from scientific research conducted elsewhere.

Relative to the status quo, we consider three alternative scenarios: (a) 50 percent of those in need receive treatment and 30 percent of it is evidence based, (b) 50 percent of those in need receive treatment and all of it is evidence based, and (c) 100 percent of those in need receive treatment and all of it is evidence based.

In the latter scenario, we find that society could save up to $2,310 per person with PTSD alone, up to $3,000 per person with comorbid PTSD and major depression, and up to $9,240 per person with major depression alone—all in just the first two years following deployments—by ensuring that 100 percent of those in need receive evidence-based care. When we exclude the cost of lives lost to suicide, expanding access to evidence-based care for everyone in need would save money only for major depression. This finding reflects the high cost of PTSD treatment and the limited evidence of its benefits.

Figure 5 shows the results on a national basis. The two-year national cost for PTSD and major depression could be reduced by as much as $1.7 billion—or $1,063 per returning veteran—if evidence-based treatment were delivered to all in need. The savings would come from increased productivity and fewer suicides. Even excluding the cost of suicides, the nation could still save $60 million by treating both mental disorders.

Lost productivity can be a large driver of the costs associated with PTSD and major depression. Fully 95 percent of the costs can be attributed to reduced productivity when we exclude the cost of suicides. When we include the cost of suicides, reduced productivity still accounts for 55 percent of the total estimated costs (see Figure 6).

Given these results, evidence-based treatment for PTSD and major depression would pay for itself within two years. If the costs stemming from substance abuse, homelessness, family strain, and other indirect consequences were included, the savings gained from quality treatment would be even greater. Investing in evidence-based treatment makes sense to society at large and to the U.S. Department of Defense.
as an employer, not only because of higher remission and recovery rates but also because such treatment would increase the productivity of servicemembers and veterans. The benefits in retention and increased productivity would outweigh the higher costs of providing evidence-based care.

**Traumatic Brain Injury**

TBI is a head trauma that either temporarily or permanently disrupts the brain’s functions. In combat situations, TBI can be caused by improvised explosive devices, mortars, vehicle accidents, grenades, bullets, mines, and falls. As such, TBI can be difficult to diagnose. Its symptoms can range from headaches, irritability, and sleep disorders to memory problems and depression.

TBI varies in magnitude from mild to severe. Mild TBI, commonly known as a concussion, is associated with full functional recovery in 85 to 95 percent of cases. The vast majority of individuals who screen positive for having experienced a probable TBI are likely to have experienced a mild TBI and to regain full cognitive functioning within one year.

But mild as well as moderate and severe TBI can all result in long-term impairment, including difficulty in returning to work. The most common cognitive consequences following moderate to severe TBI are problems with attention and concentration and deficits in new learning and memory. Moderate to severe TBI can also involve skull fractures and intracranial lesions, and it can lead to death.

We estimated TBI costs for a single year because there are insufficient data to project two-year costs. The cost varies substantially according to the severity of injury. The estimated one-year cost per case of mild TBI ranges from $27,260 to $32,760. The estimated one-year cost per case of moderate to severe TBI ranges from $268,900 to $408,520 (see Figure 7). Many of the costs of TBI, particularly for those with moderate to severe injuries, will continue in the long term. Therefore, our cost estimates are likely conservative.

There is great uncertainty surrounding the societal cost of TBI, because serious questions remain regarding the total number of TBI cases, the severity of the cases, and the extent of comorbidity with PTSD and major depression. Based on just the 2,726 cases of post-deployment TBI that have been documented through mid-2007, we estimate that the total one-year societal cost of TBI ranges from $591 million to $910 million, depending on different assumptions about treatment levels, wage reductions, relapse probabilities, and suicide attempts among veterans with mental health conditions. Both scenarios assume that 30 percent of those in need receive treatment and that 30 percent of this treatment is evidence based.

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<th>Percentage</th>
<th>Low-cost estimate for PTSD and major depression</th>
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<td>Lost productivity</td>
<td>Treatment</td>
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<td>Treatment</td>
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**Figure 6—Lost Productivity Can Be a Large Driver of the Societal Costs Associated with PTSD and Major Depression**

*Source: Invisible Wounds of War, 2008.*

*Notes: The cost components are based on a two-year projection for 50,000 servicemembers returning from Iraq or Afghanistan at the age of 25 at a rank of E-5 with five to seven years of service. The low-cost and high-cost scenarios incorporate different assumptions about wage reductions, relapse probabilities, and suicide attempts among veterans with mental health conditions. Both scenarios assume that 30 percent of those in need receive treatment and that 30 percent of this treatment is evidence based.*

Many servicemembers feel that seeking mental health care could damage their career prospects, deprive them of a security clearance, and diminish the trust of coworkers.
Productivity losses may account for 47 to 57 percent of costs associated with mild TBI cases. For moderate to severe TBI cases, which can lead to death, mortality is the largest cost component, accounting for 70 to 80 percent of costs (see Figure 8).

### Health System Limitations

In recent years, the defense department and the U.S. Department of Veterans Affairs (VA) have been expanding their health services, especially in the areas of mental health and TBI. But several gaps remain, both within and beyond the U.S. military health care systems.

There is a wide disparity between the need for mental health services and the use of those services. This disparity stems from structural factors, such as a shortage of providers, as well as from personal, institutional, and cultural factors. Servicemembers often cite concerns about the negative career consequences of using mental health services. Many servicemembers feel that seeking mental health care could damage their career prospects, deprive them of a security clearance, and diminish the trust of coworkers (see Figure 9).

There is a vast unmet need for care. In our survey, only 53 percent of the returning servicemembers who met criteria for PTSD or major depression had sought help for these conditions in the previous year. For those who experienced a probable TBI during deployment, only 43 percent had been evaluated by a physician for a brain injury.

For PTSD and major depression, there are shortfalls in the delivery of quality care as well. Of the servicemembers who had these conditions and did seek treatment, just over half received minimally adequate treatment (at least eight sessions of psychotherapy or a minimal course of medication). The number who received high-quality, evidence-based treatment would be even fewer.

There are also holes in monitoring the quality of care provided to the nation’s veterans. The VA has been a leader in promoting quality, and the documented improvements in the quality of VA care for depression in particular are impressive. But studies evaluating the quality of VA care for PTSD have not been published to date. Moreover, the VA’s quality improvement efforts have not been extended to the hundreds of community-based Vet Centers that typically operate out of storefront settings around the country. At the same time, similar efforts have not been implemented within the defense department’s military health system.

With respect to treating TBI, limitations in medical knowledge need to be addressed. More research is needed to determine what quality treatment for TBI entails. Moderate to severe forms of TBI may require both traditional medical treatment and mental health care. TBI symptoms include those of other mental health conditions, thus requiring the coordination of different professionals from physical medicine and rehabilitation to mental health care. Moderate and severe TBI also present unique needs for close coordina-
tion across the VA and defense department with other community agencies.

Finally, the VA faces a challenge in providing access to younger veterans, particularly in facilities now serving mostly older veterans. The VA needs better projections of the treatment demand among newer veterans to ensure that proper resources can be allocated for them as well.

**Systemic Solutions**
Lessons from the health services field suggest that a sustained systems approach will be required to make meaningful advances in care. Attempts to fill the current gaps in care will not be successful unless they take into account the other components of the system.

For instance, expanding the number of mental health providers will not make mental health care more accessible if the concerns about negative career consequences associated with mental health care are not alleviated. Evidence-based care cannot be implemented effectively unless there is a way to continuously measure and improve it.

And although the VA has been a leader in promoting quality care in the United States, not all veterans receive their care through the VA. Many veterans seek care through private employer–sponsored health plans and through the public sector, such as Medicaid.

Therefore, a major national effort is needed to expand and to improve the capacity of the U.S. mental health system to deliver effective care for servicemembers and veterans. This effort must incorporate the military, veteran, and civilian health care systems. It should focus on training more providers to use high-quality, evidence-based treatment methods, and it should encourage servicemembers and veterans to seek needed care. The scale of the effort presents the country with an enormous challenge, but also an opportunity.

We offer recommendations that apply to the entire national health care system—military and civilian, public and private. Efforts to implement these recommendations should be standardized to the greatest extent possible within the defense department, within the VA, across these systems, and throughout the community-based civilian health care sector.

### Increase and improve the capacity of the mental health care system to deliver evidence-based care.

The systems of care for treating these conditions have been improved, but not enough.
als. Because the dramatic increase in need for services already exists, the required expansion in the number of trained providers is several years overdue.

*Change policies to encourage more servicemembers and veterans to seek needed care.* Servicemembers need ways to obtain confidential services without the fear of negative career repercussions. There should be no perceived or real adverse career consequences for individuals who seek treatment, except when functional impairment—such as poor job performance or being a hazard to oneself or others—compromises fitness for duty. Providing options for confidential treatment can enhance force readiness by encouraging individuals to seek needed care before problems rise to a critical level. In this way, mental health treatment would be appropriately used by the military as a tool to avoid or to mitigate functional impairment, rather than as evidence of functional impairment.

*Deliver evidence-based care in all settings.* Providers in all settings should be trained and required to deliver evidence-based care. This change will require the implementation of new procedures to ensure sustained quality, to coordinate care, and to enable quality monitoring and improvement across all settings in which servicemembers and veterans are served. Providing evidence-based care is not only the humane course of action; it is also a cost-effective way to retain a ready and healthy military force for the future.

*Invest in research to close the knowledge gaps and to help plan effectively.* Medical science would benefit from a deeper understanding of how PTSD, major depression, and TBI evolve and how treatment can affect outcomes. The United States needs a national strategy to support an aggressive research agenda across all medical service sectors on behalf of returning servicemembers and veterans.

As the conflicts in Afghanistan and Iraq continue, the prevalence of mental health and cognitive conditions could grow higher. Without effective treatment, these conditions will carry significant long-term costs and negative consequences. The systems of care for treating these conditions have been improved, but not enough.

Ultimately, this issue reaches beyond the defense department and the VA and into the broader U.S. health care system and society at large. The entire system must adapt to the needs of returning servicemembers if the nation is to meet its obligations to military veterans now and in the future. Safeguarding the mental health of servicemembers is an important part not only of ensuring the future readiness of U.S. military forces but, even more important, of compensating and honoring those who have served the nation.

**Related Reading**


To celebrate the 60th Anniversary of the RAND Corporation and to uphold its tradition of taking on the big issues of tomorrow, a call went out to all RAND staff around the world, inviting them to propose essays on “important policy issues not currently receiving the attention they deserve in the public debate”—issues, in other words, that might be on the back burner today but will likely become front-burner issues within the next five years.

More than 100 issues were raised. The final product: the 11 essays published here. These were selected either because they highlight major public policy problems that have eluded the mainstream media radar or because they point toward major public policy solutions that have been likewise overlooked—or both.

Despite the wide range of topics, from corporate malfeasance to antimicrobial resistance, common themes emerge. The biggest one is the shaky financial footing that threatens to undermine several pillars of the public interest: Medicare, Social Security, roads, bridges, water systems, power grids, elections, military operations, diplomatic endeavors, and public health. At the same time, there are national and global reasons for hope. There is even a concluding vision of a new and better form of statecraft.

Readers might be tempted to connect the issues outlined here with those being debated on the U.S. presidential campaign trail, but that is not the intent. Our goal is to raise public awareness of several salient issues that will likely grow in prominence regardless of the election outcome.

—John Godges
The Aging Couple

By Melinda Beeuwkes Buntin and Susann Rohwedder

Melinda Beeuwkes Buntin is associate director of the Economics, Finance, and Organization Program within RAND Health. Susann Rohwedder is a RAND economist specializing in the economics of aging.

On New Year’s Day this year, 62-year-old Kathleen Casey-Kirschling became the first baby boomer to cash a Social Security check. Seventy-eight million members of her generation will soon follow, threatening the long-term viability of Social Security. But the greater challenge comes in three years when the baby boomers start becoming eligible for Medicare.

The plight of the Social Security trust fund is well known. Outflows are projected to exceed inflows beginning in 2017; without corrective action, the trust fund will be depleted by 2041. But the Medicare trust fund is in worse shape: Outflows will begin to exceed inflows this year, and projections indicate that it will be exhausted by 2019 (see the figure).

More worrisome still, these projections may actually understate the extent of Medicare’s funding problems. Health care costs have historically grown faster and less predictably than general inflation. This means that the Medicare trust fund could expire even sooner than most economists are projecting and that modest adjustments to taxes or benefits won’t bring the fund into balance.

What has brought on this double-barreled funding crisis? Two factors stand out. First, Americans are living longer. Men reaching retirement at age 65 today typically look forward to a further 17 years of retirement, compared with fewer than 13 years back in 1965. The result is that retirees are receiving Social Security and Medicare benefits for far longer than the designers of the program ever envisioned. But more important, the cost of health care has increased rapidly, thanks largely to the pace of technological innovation.

Social Security and Medicare’s looming budget shortfalls pose real problems. But any problem caused by longer lives and medical breakthroughs must be approached cautiously. Social Security and Medicare’s financial problems are real, but so are their achievements: historic reductions in poverty among seniors, greater longevity, and the provision of cutting-edge medical technology to seniors. The challenge for policymakers is to address the two programs’ financial problems while building on these gains.

Successful reforms will reflect this central insight: Social Security and Medicare have reinforced each other’s benefits and now suffer from intertwined problems. Reforms to one must, at the very least, take into account effects on the other. For example, raising the Social Security early retirement age would result in people working longer and paying more into both Medicare and Social Security, even if the age of eligibility for Medicare was not changed. At the same time, allowing Medicare, rather than employer-sponsored health insurance, to be the default source of coverage for those over age 65 could reinforce such a policy by reducing the cost of employing older workers and expanding their job opportunities. On the flip side, allowing people to buy into Medicare early could encourage earlier retirements.

Social Security and Medicare are like an aging boomer couple: The sooner they start planning and saving for retirement, the better off they’ll be. But early action alone isn’t enough. Like any successful couple, each program needs to make its plans with the other in mind.

Social Security and Medicare’s financial problems are real, but so are their achievements.
Corporate America’s Next Big Scandal

By Michael D. Greenberg and Robert T. Reville

Michael Greenberg is a RAND social scientist specializing in civil laws and regulation. Robert Reville is director of the RAND Institute for Civil Justice.

Although the businesses are usually surprised, most scandals involving corporate ethics are predictable.

Before the scandal breaks, practices that are widespread are assumed to be ethical. A change in economic circumstances triggers new scrutiny of business practices, and then—voila—a scandal. This was the sequence for Enron, WorldCom, and Tyco, and it’s playing out now in the subprime lending collapse.

Where is it likely to surface next? Signs point to corporate income tax avoidance. Corporations routinely engage in extensive tax planning and elaborate schemes to minimize their tax burdens. Offshore tax sheltering, stock option write-offs, and “synthetic leases” are all examples of the complicated accounting and business strategies that corporations follow to take maximum advantage of tax laws. Taking advantage of loopholes can be legitimate. At times, it is even encouraged: tax credits for the purchase of hybrid vehicles, for example. But the line is fuzzy between tax avoidance, which is legal, and tax evasion, which is not. In 2006, a scandal emerged at accounting firm KPMG over tax shelters marketed to wealthy clients—a harbinger, in our view, of things to come.

The Internal Revenue Service (IRS) estimates that the difference between what corporate taxpayers voluntarily pay and what they are legally obligated to pay—the so-called “corporate tax gap”—was $32 billion in 2001. Such figures are notoriously hard to estimate, but this is broadly consistent with other evidence.

One study found that among a sample of 250 large U.S. corporations, the annual effective tax rate declined from 2001 to 2003—a period when corporate profits rose substantially—and dozens of major U.S. corporations paid no income taxes for at least one year during that interval. Statistics from the U.S. Department of Commerce and the IRS show that the proportion of net corporate income actually paid in federal taxes declined substantially from 2001 to 2004. Perhaps it is no coincidence that, according to the U.S. Government Accountability Office, only about 1 percent of corporate returns are reviewed by the IRS.

Meanwhile, demographic shifts, such as the retirement of the baby-boom generation, could lead to a fiscal crisis and a requisite change in economic circumstance that would trigger the next wave of corporate scandals. The Congressional Budget Office has estimated that Social Security and Medicare, which accounted for 5 percent of gross domestic product in 2004, will rise to 13 percent by 2025 and 19 percent by 2050. This combination of “tropical instability,” in the form of a cash-strapped federal government, and the “warm water” of corporate tax avoidance strategies together could create the conditions for a perfect storm, in which widespread tax avoidance practices abruptly become illegal and fraudulent.

In the United Kingdom, tax authorities have been promoting a voluntary “Tax in the Boardroom” agenda to target corporate tax avoidance. This approach is catalyzing greater scrutiny of tax practices by UK corporate board audit committees, and tax practice is increasingly seen as part of a company’s corporate social responsibility program. If the boards of American companies learn from some of the best practices of their British competitors in reviewing tax avoidance strategies, they may be able to avoid the next big scandal.

The line is fuzzy between tax avoidance, which is legal, and tax evasion, which is not.
Innovative Infrastructure

By Martin Wachs

Martin Wachs directs the Transportation, Space, and Technology Program within RAND Infrastructure, Safety, and Environment.

Americans are awakening to the fact that our roads, bridges, water systems, and power grids are falling into disrepair and are desperately in need of renewal. Governments are neither building new capacity to match the growth in demand nor maintaining existing infrastructure sufficiently to reverse deterioration.

We must come to grips with this problem. But rebuilding and repairing critical infrastructure systems is only part of the challenge. We need to reinvent the systems themselves.

Instead of relying on human inspectors holding clipboards to monitor the condition and maintenance requirements of bridges, tunnels, and pipelines, we should be embedding small but powerful and inexpensive electronic sensors to issue automatic warnings when repairs are needed. These devices are more accurate, yet far cheaper, than human inspectors who eyeball complex facilities and see only the surface signs of wear and tear.

The collapse of a major highway bridge in Minnesota might well have been avoided had we invested in technologically advanced monitors of its stresses and strains, perhaps even allowing the bridge to be cleared of motorists as dangerous conditions developed before it fell down.

Instead of hunting for parking in a crowded shopping center by driving up and down aisle after aisle—burning gasoline, breathing fumes, creating greenhouse gases—we could rely on computers and cell phones to tell us where spaces are available in advance and to direct us to them. We wouldn’t have to build as many spaces to begin with, since each would be used far more efficiently.

The same sort of technology can improve economic efficiency. Rather than pricing road use by taxing gasoline by the gallon—the clumsy and indirect way we now pay for highway driving—we can shift to electronic meters in cars to charge different rates for using different types of roads at particular times of day. We could charge more for vehicles, like heavy trucks, that do more damage to roads than do cars.

Likewise, in many places today water is still not metered, but paid for from taxes on property that don’t relate to how much water we consume. Existing technology can bill us more fairly for water and power, varying the charges with the costs of providing the services and thereby promoting conservation.

America’s infrastructure needs fixing. As we enjoy new gee-whiz computer applications at work and play, we should not overlook the opportunity to employ the latest technology to solve problems that threaten daily living. Our most critical infrastructure systems should be supported by technology at least as modern as we expect to find in an iPod or video game.

The collapse of a major highway bridge in Minnesota might well have been avoided.
The Day After When Electronic Voting Machines Fail

By Ian P. Cook

Ian Cook is a RAND management systems analyst with expertise in technology, information, and innovation.

In any democracy, delivering on the promise that every vote should count depends fundamentally on the ability to count votes accurately.

In the wake of the contentious 2000 presidential election, the Help America Vote Act of 2002 spurred rapid adoption of electronic voting machines as a supposedly superior method to that of punch cards. Today, 84 percent of registered voters live in precincts that rely on computers for voting, ballot counting, or both.

But huge questions remain about the reliability of these machines and their susceptibility to error and fraud. While computer experts debate the machines’ merits and faults, policymakers need to confront the real threat of a spoiled election. In the Arkansas primary elections this past May, two voting machines allocated votes cast in one race to another, resulting in the wrong candidate being declared the second race’s victor. Local election officials discovered the error while investigating a separate, unrelated voting glitch. A paper trail allowed them to correct the error, but the cause remains unknown.

Computerized voting is not simply a new twist on the old problem of vote tampering; computerized voting introduces verification problems that cannot be addressed through traditional means. The computer software that either registers or counts votes is so complicated that it can almost never be proven free of error or malicious code. During elections, officials cannot monitor the machines for anything more than superficial problems. Serious flaws can be misdiagnosed, allowing the machines to be left in use.

Voting machines are produced by a limited number of companies with an equally limited interest in broadcasting the prevalence of any security issues. Bugs or malicious codes are propagated as each machine is built, replicating any underlying problem. For those with ill will, the cost of producing a fraudulent vote is radically lower than it was before.

Election audits are not uniformly required or implemented across the United States, allowing for the possibility that errors may go unnoticed or that fraud may be targeted at precincts with slack rules. Auditors might not see enough irregularity to cause concern on a precinct-by-precinct basis, while problems in the aggregate could decide an election.

Recounts are usually triggered only in a close election, rather than as a tool to locate and root out error or fraud. Even if a paper trail is produced from a computerized voting machine, hand recounts are highly uncertain, proving to be less reliable in closer elections—precisely when an accurate accounting of each vote is most precious. Moreover, paper trails that indicate problems do not reveal anything about the underlying causes.

Readily apparent—and woefully unaddressed—is the fact that computerized election systems demand a dramatically more robust audit process for certifying election outcomes than is currently in place. Post-voting testing protocols for machines need to be developed on a scale large enough to reproduce errors or fraud that might have been introduced during an election. State election officials need better statistical guidance, to know when results warrant further investigation and how to distinguish error from fraud.

Transparency has to be the watchword—not only for the software inside the machines, but also for the data produced by the election itself. Election bodies could help deter threat of fraud, raise the likelihood of detecting systematic error, and elevate the level of public trust by facilitating, or even mandating, electronically available, open-access vote tallies that would enable wide-scale investigation by any interested party.

Refining voting machines alone cannot guarantee election security. Nor should we turn back the clock and ignore the benefits of electronically enabled voting. Rather, in the face of ever-greater reliance on electronic tools, the nation must confront the demonstrated likelihood of an election decided by error or deception—and take quick steps to minimize it.

Princeton University Professor Edward Felten and two graduate students released a report and video in 2006 on how easily they tampered with a commonly used electronic voting machine. One of the graduate students picked the lock in ten seconds and installed malicious software in less than a minute, showing the potential to rig elections.

AP IMAGES/MEL EVANS
Regardless of which party wins the White House, the next administration will start Day 1 with a daunting task: establishing its national security priorities in the face of a declining military budget.

Over the last 70 years, U.S. defense spending has risen and fallen every 18 to 20 years, reflecting alternating periods of conflict, peace, and varying administration priorities (see the figure). Following that trend, defense spending began to grow again in the late 1990s and accelerated after 9/11. Riding this tide, current Pentagon planning assumes continued high levels of funding, including a larger army, a return to a 300-ship navy, and new technology in each service.

But the days of high defense budgets are numbered. The pressures that have historically led to cuts in defense budgets have reemerged. Voter fatigue with ongoing conflicts will pressure Congress and the White House to reduce military spending, just as a sputtering economy will spread thinning tax revenues over a growing number of claimants. The discretionary government programs that have seen little to no growth in recent years, such as infrastructure investment, will likely demand more funding attention. The retiring baby boomers will demand more from the Social Security and Medicare programs.

All of this may well prove vexing to the new administration, but it will nonetheless be expected to provide straight answers to tough questions: What are our biggest national security threats? How do we confront those threats? What is the military’s role in our democracy?

The answers will be influenced by available resources and the condition of the military. If history is any guide, and absent an extraordinary event, defense spending will decline significantly over the next decade. Managing this decline will require careful balancing of the risks and responses to the nation’s security requirements as well as reevaluating the size and configuration of the armed forces and defense agencies.

The military’s daily task list is not growing shorter. The Cold War era demanded basing forces on the periphery of the Soviet Union, and many of those forces remain in place. Newer requirements are rooted in the response to the 9/11 attacks and reflect commitments to the global war on terror. In between are demands required by the potential for major combat operations in diverse locations. Meanwhile, new military tasks are added as new threats are discovered: a potential military response to a rising China, countering the proliferation of weapons of mass destruction, and working with new military partners in former communist states and in the emerging world. But it is unreasonable to expect that the military can do more with less, so the question will become: What things should no longer be done?

The challenge is real. But a new administration and the pending Quadrennial Defense Review offer a unique opportunity to reexamine how the country should maintain military effectiveness in a time of limited resources. What is needed is a reassessment of the rules of the game: a redetermination of the real and most important dangers to the country and how to shape and size the military capability.

Eight years ago President Bush submitted his first budget at a time when the defense department’s spending trend was up. In presenting his request, the president said, “A budget is much more than a collection of numbers. A budget is a reflection of a nation’s priorities, its needs, and its promise. This budget offers a new vision of governing for our nation.” The sentiment remains true, and it will be the true measure of change for a new administration.

National security experts tend to agree that al Qaeda and China will be America’s greatest security threats in the decades to come. However, the loosely connected “global rejectionist front” made up of Russia, Iran, Syria, Venezuela, Bolivia, Ecuador, Belarus, and elements of the European far left could be emerging as a direct counter to American global interests.

This improbable group does not play geopolitics in its traditional form. It aims to discredit American doctrines of free markets, globalization, and liberal democracy. Its ideology is an eclectic mix of authoritarian capitalism, as in Vladimir Putin’s and Dmitry Medvedev’s Russia; populist socialism, such as Hugo Chavez’s Venezuela; and the anti-imperialism of the European far left and radical Shia Muslims.

The members have forged their coalition with anti-American rhetoric, a coercive use of oil and natural gas shipments, and deterrence through asymmetric warfare capabilities. Key proponents like Chavez have used the U.S. invasion of Iraq and its war in Afghanistan to cement ties among coalition partners. Social forums in Latin America and Europe, designed to counter events such as the World Economic Forum, have helped them debate and refine their intellectual counter-ideals and take an active stance on international issues.

If this global rejectionist front transcends religious, cultural, and hemispheric barriers and sustains its alliance, it could undermine U.S. interests on several levels. First, it could challenge American initiatives and values in international forums like the United Nations and the Organization of American States. Second, it could use its control over abundant energy resources to further drive up oil prices and to slow U.S. economic growth. Third, it could erode U.S. ideological influence in Latin America, the former Soviet Union, and Europe.

To counter such strategies, the next U.S. president should weaken the rejectionist front before it seriously threatens U.S. interests. One opportunity is to provoke defections by creating fault lines within the group. The United States could induce Syria’s defection, for example, by offering economic aid, a free-trade pact with the United States, and intelligence support for Syria’s domestic anti-Islamist campaign.

The United States could deepen relations with friendly European, Latin American, and Middle Eastern states, political parties, nongovernmental organizations, and civil-society groups, with the goal of reducing the rejectionist front’s clout. It could also address the concerns of those people in the coalition states who do not necessarily share their leaders’ hostility toward America and who could become a force for domestic reform if supported by appropriate American public diplomacy campaigns.

The convergence of these states and groups around an anti-American, anti–free market ideology is empowering the rejectionist front in the promotion of its agenda. If the next American president does not recognize and counteract such a threat, the growing influence of this alliance could obstruct a wide range of U.S. diplomatic initiatives, harm the U.S. economy, and reduce U.S. influence around the world. ■
ISSUES OVER THE HORIZON

The Future of Diplomacy
Real Time or Real Estate?

By Jerrold D. Green

Jerrold Green, a Middle East expert associated with RAND, is president and chief executive officer of the Pacific Council on International Policy.

When we think of embassies, we typically think of majestic buildings that house ambassadors and the diplomatic corps around the globe. But in an era dominated by the Internet, cellular telephones, videoconferencing, and better global airline connections, policymakers need to reassess whether retaining many traditional in-country functions of embassies still makes sense.

Embassies are, in fact, vestiges of a bygone era. They are vulnerable, expensive, and cumbersome. And at a time when cultural knowledge is as crucial as it ever has been to the United States, policymakers need to consider whether the antiquated embassy-based model we now use helps or hinders us in achieving this crucial goal.

In the future, much of the transactional and administrative work of embassies could be “off-shored” or directed to a home office where it could be accomplished better, more quickly, and at less cost than is the case today. Take the following examples.

Aspiring visitors need to apply for visas? Go to the online visa application center, which would provide a video link to Washington, D.C., so that interviews could be conducted and identities checked through biometrics.

Diplomats need to convene meetings with local officials? They could fly in as needed. This already happens, because many countries cannot afford embassies in every capital and thus have ambassadors who are responsible for several countries at a time. Indeed, the United Kingdom is experimenting with “laptop diplomats,” who transcend single countries and operate outside traditional embassies.

In short, with some imagination, many embassy-based functions could be effectively conducted on a need-to-be-in-situ basis. Of course, some diplomats will always be stationed overseas to handle particularly sensitive, specialized, or high-level tasks. But their number will be far fewer than today and their office spaces more practical, low key, and less vulnerable than are traditional embassies.

What will remain—and what should be appreciably improved—is an in-country presence that is sharper, more focused, and infinitely more effective than is currently the case. This, after all, is what representation is supposed to achieve in the first place. Although globalization is promoting homogenization in some sectors, significant cultural, language, political, and societal factors still make each country unique. Our need to understand these countries in their true complexity is increasing, not diminishing.

Unfortunately, as currently configured, embassies are impediments to gaining these valuable insights because they seclude and “immunize” their personnel from local life rather than immersing them in it. As evidence, all citizens should experience firsthand the security gauntlet that places all American diplomatic legations virtually off limits to all but those who work in them.

To be effective, embassies need to function as integrators, not island fortresses. When they function as the latter, as they now do everywhere, they negate the very mission they are expected to accomplish. Diplomacy and foreign affairs need to bring together the key players of globalization—the diplomatic community, the business community, the information and communications professionals, the cultural experts, and the military commanders—and not keep them at arm’s length, as is the practice today.

Embassies need to function as integrators, not island fortresses.
Corporate Counterinsurgency

By William Rosenau, Peter Chalk, and Angel Rabasa

William Rosenau, Peter Chalk, and Angel Rabasa are RAND political scientists who focus on counterinsurgency and counterterrorism.

Historically, the American approach to counterinsurgency has concentrated almost exclusively on building up a threatened state’s ability to develop and marshal the resources required to contain and, if possible, prevent serious internal violence. Yet despite our best efforts, many states may never be able to build the needed capacity.

While building this indigenous capacity will always be an element of American counterinsurgency, a new trend is emerging—that can help U.S. policymakers shape conflict environments in ways that support U.S. objectives.

In many violent regions, multinational corporations are the only institutions with the financial resources and technical expertise necessary to reduce armed conflict. In countries as diverse as Nigeria, Colombia, and the Philippines, such companies are working to diffuse violence by supporting community development, creating new security structures, and supplying social services.

To be sure, relatively few of these companies operate in highly violent environments. When serious conflict breaks out, most companies leave. But for firms in extractive sectors such as oil and mining, relocation is rarely an option. Not only are they compelled to remain where the natural resources are, long production cycles and expected returns on (extensive) investment frequently outweigh the costs of continuing to operate in a conflict-ridden area.

For the companies that remain, the endemic weaknesses of states across the developing world frequently preclude their reliance on local governments to restore order, promote stability, and reduce conflict. Therefore, in many cases, the task falls to the companies themselves.

Some firms operating in zones of violence choose to simply enhance the physical security of their facilities and personnel. Others act more strategically, offering micro-credit loans, building hospitals and schools, and providing job training in the hope of reducing at least some of the sources of conflict.

Certain companies have engaged in more ambitious efforts to shape their operating environments. Working in an essentially lawless region of Papua New Guinea, Placer Dome (now Barrick Gold), a major Canadian mining company, trained an indigenous police force that was widely hailed as responsive to local concerns and effective in controlling violent crime. And in Colombia’s oil-bearing Casanare region, where global energy group BP has major operations, the company helped establish a “House of Peace and Justice” to give the local community greater access to public-safety services.

Of course, not all activities by multinational corporations in conflict zones have produced positive results. On one level, corporate activities can unintentionally fuel war economies. In Colombia, for instance, revenue from oil company operations has become a target for predation by rebel groups, who view these funds as part of the legitimate spoils of war. On another level, grievances related to extraction—such as unfair land expropriation, the pollution of agricultural land, and the failure of central governments to share resources with oil- and gas-producing regions—have also helped fuel conflicts in Nigeria, Sudan, and Indonesia.

Appreciating how multinational corporations affect their environments and how their efforts can be harnessed to support U.S. counterinsurgency strategy should be a priority for national security policymakers. This effort will entail understanding how corporate counterinsurgency can shape conflict environments in positive ways as well as ways that can challenge U.S. interests.
ISSUES OVER THE HORIZON

Beating the Germ Insurgency

By Melinda Moore

Melinda Moore is a RAND public health physician with expertise in global health, military health, and emergency preparedness.

Antimicrobial drugs are designed to fight infectious diseases, but the germs are fighting back—and winning. Worse, the public has failed to grasp the global health threat posed by infectious diseases that are resistant to therapeutic drugs. Our complacency will be costly—and surely deadly.

Eight years ago, the World Health Organization declared that the threat of antimicrobial resistance was growing and that “our window of opportunity is closing.” It referred to the specter of a post-antibiotic era in which diseases resist virtually all available drug therapies. But this clarion call to arms has largely been ignored.

Taking on the microbial enemy will require an effective “counterinsurgency” effort. What is this enemy, what is the strategy, and how can we mobilize to win?

Antimicrobial resistance, or AMR, magnifies the threat from major infectious diseases for which there are therapeutic drugs but no vaccines: malaria, tuberculosis (TB), HIV, diarrheal diseases, and acute respiratory diseases. Compared with treating infections that respond well to ordinary treatments, treating drug-resistant infections is generally more difficult, more expensive, and not as successful.

Consider malaria, a disease that kills as many as two million people annually worldwide. Not long ago, a case of malaria could be treated with a single drug for about 8 cents. Now, because of resistance, treating malaria requires single drugs or drug combinations that cost $1, $7, or as much as $35—a prohibitive expense in a poor country.

TB is another prevalent and deadly example: About 5 percent of nine million new cases globally are resistant to at least two of the four standard drugs used. Treatment for drug-resistant TB costs about 200 times more than standard treatment and still results in lower cure rates.

Drug resistance is due in large part to antimicrobial drug misuse, such as poor prescribing practices: doctors prescribing too low of a dose, too short of a time, or just the wrong drug. Patients sometimes improperly self-medicate or demand inappropriate treatment. Drug quality is uneven. Institutional factors like poor hospital infection control and the inappropriate use of antibiotics in food animal production also play a role. Compounding the problem, market forces have led to lagging innovation in antimicrobial drugs.

All these factors demand a multifaceted strategy for the war on AMR—a comprehensive solution that will overcome global inertia and mobilize the tools we already have to beat this complex and wily enemy. And we need leaders—from the public and private sectors, health and non-health sectors—to mobilize the resources, support the research, lead the policy changes, and implement new ideas, including those outlined by the World Health Organization. We must create the market and social incentives to help drive such action.

In short, we must meet this major health threat or face the future of a dangerous post-antibiotic era. Unlike wars of the past, the war against AMR will never end. We must adapt and remain vigilant to help ensure a healthier world.
ISSUES OVER THE HORIZON

A Second Reproductive Revolution

By Jonathan Grant, Stijn Hoorens, and Aruna Sivakumar

Jonathan Grant is the president of RAND Europe. Stijn Hoorens is a RAND Europe analyst specializing in population aging and reproductive technologies. Aruna Sivakumar is a RAND Europe economic modeler.

Thirty years ago, a young British couple, frustrated with their inability to conceive, took part in an experimental medical procedure in which an egg from one of the woman’s ovaries was removed, fertilized in the lab, and the resulting embryo was implanted in her uterus. Nine months later, on July 25, 1978, the world’s first test-tube baby, Louise Jay Brown, was born.

A generation later, demand for in-vitro fertilization (IVF) is higher than ever and climbing. In the United States, the number of IVF cycles more than doubled between 1996 and 2005, and IVF has become the flagship in a fleet of treatments that offer a solution to infertility.

But if used in combination with “egg banking”—a process by which healthy female eggs are frozen for future use—the promise is even more radical: to stop the biological clock entirely. Should this happen, the result will be a second reproductive revolution equal to that sparked by the contraceptive pill in the 1960s.

Whereas the pill gave women the choice of whether to have children, the new science offers the choice of when to have them. This will transform the structure of Western society within a generation.

In the next five years, egg banking will become increasingly commercially available in the United States and Europe. The wheels are in motion. Yet uncertainties persist. The long-term health effects on children and mothers, for instance, remain a question mark. Ongoing research and careful monitoring of outcomes are essential. Regulation is also key. Without it, a profit-driven industry that caters to consumers who are making emotional purchasing decisions could run amok, with best practices giving way to unscrupulous approaches. But if the uncertainties prove surmountable, the transformation will be far-reaching, with sometimes double-edged outcomes.

Fertility treatments primarily available on a commercial basis will threaten to perpetuate an entrenched system of inequities. With older, richer parents, the children born through assisted reproductive technologies will enjoy the educational, financial, social, and political advantages that come with wealth. Although their numbers are now small, they are likely to swell within several decades. Eventually, the “IVF-lings” could emerge as a distinct political and social force—the “soccer moms” of tomorrow—with a collective voice wielding a decisive influence.

In another sphere, an end to the biological clock promises to help halt the burgeoning pension crisis in European and Asian countries, which face aging populations and falling birth rates. By 2050, the ratio of working-age people to senior citizens in the European Union will have plummeted from today’s four to one to two to one. Pension and welfare systems are in danger of collapsing under this strain. Yet a sample of European women surveyed in 2006 indicated a desire to have at least one child more than they actually are having. Assisted reproductive technologies, as part of a mix of public policies, will contribute to reducing this “baby gap.”

By far the most transformative consequences will be societal. With age no longer a barrier to motherhood, the family as we know it will be turned on its head. Sixty-five- and 35-year-old mothers will mingle at school events. Grandchildren will routinely be older than their uncles and aunts. A 25-year-old daughter could give birth down the hall from her 55-year-old mother.

The tremendous gains for women’s liberation first achieved by the pill will be extended: Women will be freed from the demands of juggling family and career (to the detriment of career) and will attain ever-greater financial independence. The structure of the labor force and of relationships between the sexes, both inside and outside the family, will change irrevocably. As deeply embedded norms are tested, the pressure on society to adapt will be profound. ■
From Nation-State to Nexus-State

By David Ronfeldt and Danielle M. Varda

Big Brother may not be watching, but someone or something soon will be. People and organizations in advanced societies are deploying hosts of new sensors and linking them into vast networks to monitor what is happening in their societies and around the world. Sweeping up gobs of information like this is not new, especially for governments and businesses. What is new is the expanding role of nongovernmental and nonprofit organizations, and how information is pouring across local and national boundaries, publicly and privately.

The new “sensory apparatuses” are too myriad for easy categorization. Many pertain to perceived perils: Crime and terrorism are impelling the installation of new systems to watch cityscapes, monitor communications, and map potential hotspots. Other sensors are being deployed to detect and respond to disease outbreaks, forest fires, bird migration, and electricity spikes. Environmental and human-rights activists are developing new media to keep watch and to speed mobilization in case of an abuse somewhere, say against the Zapatista movement in Mexico. In a sense, the partisan blogospheres amount to gigantic, reactive sensory apparatuses in the American body politic.

Many technologies are involved: cameras on satellites, moisture sensors in trees, Web pages that broadcast user postings, silent alarms linked to remote monitors. Today’s computers, cameras, and radio-frequency identification tags will soon be enhanced by advances in nanotechnologies, robotics, biometrics, and alternative energy sources. Before long, what are called “anticipatory technologies” will become so widespread and effective that many surroundings will acquire ambient “intelligence”—leading to “smart” buildings and “sentient” cities that can monitor everything from leaky pipes to lost children. Concerns about top-down surveillance may be countered by bottom-up “sousveillance” (inverse surveillance).

The scope and scale of these apparatuses are growing far beyond what government, business, or civil society has ever had at its disposal or had to cope with. People across all sectors will be challenged to figure out proper designs for the sensory technologies they prefer—and how to regulate them. While this trend may sharpen conflicts between privacy and security, it may also open new pathways for transparency and accountability.

Government and business will benefit from this technology, for good and ill. Less noticed, but we think equally likely and significant, is that these tools will help spur the rise of a new social sector—distinct from the established public and private sectors—by providing networked nongovernmental and nonprofit organizations with tools not only for checking on the behavior of governments and corporations, but also for collaborating with them. We can already find evidence of these transformations in health care, integrated social services, and environmental and consumer protection.

The advance of network forms of organization and related strategies and technologies will enable policymakers, business leaders, and civil-society actors to challenge aging contentions that “government” or “the market” is the solution to particular policy problems. Inspired new ideas will arise such that, in some areas, “the network” will be the solution.

From this, we predict the emergence of the “nexus-state”—something quite different from the traditional nation-state or recent notions of an approaching market-state or network-state. The nexus-state will integrate multiple modes of governance. It will be stronger than the nation-state but also more embedded and circumscribed. It will revolve around a new kind of administration in which officials remain concerned about what is happening in their offices but become increasingly oriented by the new sensory and sectoral networks into which they are plugged.
Out of the Ashes
The Rise of the Bard Prison Initiative

UNTIL 1994, the U.S. federal government supported nearly 400 “college-in-prison” programs. But that all changed when President Bill Clinton signed the Violent Crime Control and Law Enforcement Act that year, cutting off federal support and funding for the programs. Pretty much overnight, the programs disappeared.

The New York programs endured a degree of devastation typical among the 50 states. In April 1994, each of New York’s 70 state prisons had a college within it; by that September, none did.

A handful of privately funded college-in-prison programs have begun filling the void left behind. One of the most notable of these programs is the Bard Prison Initiative. Established in New York in 1995, the initiative runs “colleges” in five state prisons, enrolling about 200 incarcerated students—women and men—full time in a rigorous liberal arts curriculum and awarding both associate and bachelor’s degrees.

Max Kenner, who spearheaded the initiative while a student at Bard College and who took over the program’s leadership upon graduation, spoke to a RAND audience about his experience in offering college courses in prisons.

Feeling Burned
The demise of public funding for college-in-prison programs coincided with a larger nationwide shift toward incarceration at the expense of public education, according to Kenner. “In the decade when I was in high school and graduated from Bard, the state of New York divested $350 million from its budget for public education and invested all that—plus $100 million more—in the state prison system.” To Kenner, the shift reflected a growing public cynicism about young people’s ability to mature, learn, and change.

The end result has been a blistering one. “Over the last generation, we have incarcerated more people, for longer and longer periods of time, at younger and younger ages, with less and less ability to improve their lives while in prison,” he said.

What’s more bothersome for Kenner is that the decision to cut funding for college-in-prison programs was made in the face of overwhelming evidence of their value. “These programs were a tremendous success as a piece of public policy. There is a vast body of evidence that nothing went so far or was as cost-effective in reducing prison recidivism and violence within prisons as these publicly funded programs.” One study showed that there was much lower recidivism among those who received degrees, regardless of whether they found a job once they left prison.

The programs were also very good as public investments, he pointed out. In its “Three State Recidivism Study” in 1997, the U.S. Department of Education found that every dollar spent on prison-based education returned more than two dollars to society in reduced prison costs. A cost-benefit analysis in Florida found similar results: more than $1.50 return for every dollar invested on average, with the highest return for degree recipients (at $3.50 for every dollar of public investment). Moreover, the federal Pell Grants used for these investments amounted to only one-half of 1 percent of total Pell Grant funding.

The decision to cut funding, Kenner argued, was at best an ethical one but not a rational one. “It was about being tough on criminals, not crime. It was an
Graduates throw their mortarboards into the air at the conclusion of their graduation ceremony inside San Quentin prison in San Quentin, California, in June 2002. San Quentin’s college classes started in 1988, the product of a call from a prison chaplain to a nondenominational private school in Oakland.

“Over the last generation, we have incarcerated more people, for longer and longer periods of time, at younger and younger ages, with less and less ability to improve their lives while in prison.”

emotional decision based on the fact that since many low-income parents couldn’t afford to send their own kids to college, why should prisoners get it for free?”

Cooling Ointment
The Bard Prison Initiative focuses on inmates in longer-term prison facilities, both maximum-security and medium-security ones, because such facilities are more “stable,” Kenner explained. “Everyone in such facilities—both prisoners and staff—is invested in having a reasonable relationship with those around them, and the prisoners have had time to come to terms with their incarceration and are around long enough to make it through the rigors of the college programs.”

There is a need for programs in shorter-term facilities as well, however. “Many people are arrested for relatively small crimes, put in a very bad place for a couple of years, and released back into the community, even worse off,” he said. One option the Bard Prison Initiative is considering is a so-called alternatives-to-incarceration program; instead of being sent to, say, Rikers Island for 16 months, low-level offenders would be given the opportunity to take liberal arts courses and, if successful, allowed to go on to complete their studies at Bard.

The current shortage of college-in-prison programs is enormous, Kenner warned. “There is no hope of returning to the historical scale through private money alone; doing so is too hard a sell given the prison population involved.” Still, the initiative is raising money for an institute at Bard to think more systematically about getting other private institutions to contribute to the effort.

Overall, he said, the need is for the federal government to become involved again and to release a portion of its Pell Grants to those who are incarcerated, if only to encourage more private involvement. “An extremely modest public investment would create a massive response from private, nonprofit educational and religious organizations. Such a policy would pay for itself, sharply cutting rates of recidivism and saving the states millions of dollars.”

AP IMAGES/ERIC RISBERG
Is it time to dust off the old textbooks of nuclear deterrence that have been relegated to the upper shelves for almost two decades? Much of the fundamental work on deterrence in the nuclear age was carried out at RAND in the 1950s and continued into the 1980s, as the United States and its allies sought to deter potential Soviet aggression and to counter the political influence of Soviet military power, including its vast nuclear arsenal. During this same period, analysts worried about the prospects of unconstrained nuclear proliferation and grappled with the nightmare of 20 to 30 nuclear-armed states spread across almost every continent.

Until recently, all this old analysis seemed irrelevant. The Soviet Union disintegrated; the Nuclear Non-Proliferation Treaty put a stop to proliferation worries; states such as South Africa gave up nuclear weapons programs; and others with nuclear weapons, such as Ukraine, gave up the weapons themselves. Of course, Pakistan and India tested nuclear weapons a decade ago, but, as mutual rivals, they had never agreed to the nonproliferation regime, and their ultimate acquisition of the weapons had been seen by most specialists as inevitable.

Now the nonproliferation regime seems to be unraveling. North Korea already has an unknown number of nuclear weapons. And Iran seems bent on obtaining the capability to build some. These two countries, unlike Pakistan and India, are part of regional security balances that involve other countries; and so the acquisition of nuclear weapons by North Korea and Iran affects the security of other countries, such as Japan and Saudi Arabia, respectively. Will the latter countries contemplate obtaining their own nuclear weapons, and will that contemplation lead yet others to try to acquire their own? And what about a resurgent Russia? That, too, could spur other countries to consider their nuclear ambitions. Are we looking toward the prospect of 20 to 30 nuclear-armed states once again?

To answer the question that opened this essay, yes, it is time to pull out the old deterrence texts. Yesterday’s analysis won’t fix today’s problems, but it offers a valid point of reference for new thinking. The old texts were written with precisely the problem of regional security balances in mind. It is easy to forget that 30 to 40 years ago, international security analysts fretted that Germany and Japan would seek their own nuclear deterrent in the face of Soviet nuclear weapons. They didn’t do so, at least in part because of U.S. nuclear guarantees. The Cold War doctrine of extended deterrence had been built around these guarantees.

Nations seek to acquire military capability, including nuclear weapons, to enhance their security. This is certainly what is driving North Korea and Iran. As the United States and its allies seek to roll back or prevent further proliferation, they will have to become students of regional security balances and assess what roles they can play in enhancing the security of regional actors, such as Japan, Saudi Arabia, Egypt, and Turkey.

Therefore, we at RAND have dusted off the old texts and are starting to develop new ones, appraising the differences between the old world and the new. It’s unfortunate that it has to be done. But it has to be done—and the sooner, the better.
As the RAND Corporation celebrates its 60th anniversary as an independent nonprofit, we invite you to join us in Santa Monica, California, for our inaugural Politics Aside weekend on November 14–16, 2008.

Politics Aside will engage philanthropists, opinion leaders, current and former government officials, and RAND research experts in a three-day post-election exploration of the world’s most pressing challenges. In the wake of much punditry and podium-pounding, Politics Aside will offer people from across the political spectrum the opportunity to take a fresh look at the issues that need to be tackled at home and abroad in the months and years ahead.

Participants in Politics Aside

The following are some of the featured guests for Politics Aside (confirmed as of August 1, 2008)

**Shaukat Aziz**, Prime Minister of Pakistan (2004–2007)

**José María Aznar**, Prime Minister of Spain (1996–2004)


**Joshua B. Bolten**, White House Chief of Staff


**Kenneth Feinberg**, Special Master of the September 11th Victim Compensation Fund

**Vicente Fox**, President of Mexico (2000–2006)

**Francis Fukuyama**, Bernard L. Schwartz Professor of International Political Economy, Johns Hopkins University

**Zalmay Khalilzad**, U.S. Ambassador to the United Nations

**Ann McLaughlin Korologos**, U.S. Secretary of Labor (1987–1989); Cochair, Politics Aside


**James Q. Wilson**, Ronald Reagan Professor of Public Policy, Pepperdine University; 2003 recipient, Presidential Medal of Freedom

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To learn more about Politics Aside, contact Tamara Turoff Keough, director of development, at (800) 757-4618 or Tamara_Keough@rand.org.

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—Donald B. Rice is president and chief executive officer of Agensys, Inc.; a RAND trustee; and a member of the Pardee RAND Graduate School board of governors. His wife, Susan, is principal of SFR Consulting and a member of the boards of Pepperdine University, the Los Angeles World Affairs Council, and the UCLA Foundation.

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