

Federation of American Scientists



Biennial Report 2008-09

Table of Contents

At A Glance	4
President's Welcome	5
Our Program Work	6
Strategic Security	8
Learning Technologies	18
Energy and the Environment	24
FAS Awards	30
Financial Statement	32
Why Join FAS?	34
Thank You For Your Generous Support	34
Board of Sponsors	36
Board of Directors	36
Contact Us	37

At a Glance



Scientists who had worked on the Manhattan Project to develop the first atomic bombs founded the Federation of American Scientists (FAS) in 1945. These scientists recognized that science had become central to many key public policy questions. They believed that scientists had a unique responsibility to warn the public and policymakers of potential dangers from scientific and technical advances, and to show how good policy could increase benefits of new scientific knowledge.

FAS emphasizes action and results. Based on careful research and analysis, FAS projects take action on important and pressing issues. FAS addresses difficult problems and is

driven to reduce the threats from nuclear, biological and chemical weapons; to shine a spotlight on secrecy in government; to develop innovative methods for education through advances in technology; and to create a more energy efficient environment.

With more than 60 Nobel laureates on its Board of Sponsors, FAS speaks with scientific credibility and provides timely technical analysis on complex global issues that hinge on science and technology. Priding itself on an ability to bring people together from many disciplines and organizations, FAS collaborates with other organizations and governments in carrying out its projects. It often

addresses critical policy concerns that are not well covered by other groups.

Today FAS has projects in nuclear nonproliferation, biosecurity, conventional arms transfers, government secrecy, learning technologies, building technologies, and energy and the environment.

FAS is a 501 (c) (3) non profit, non partisan organization and contributions may be deducted as provided in section 170 of the Internal Revenue Code.

Membership is open to all. For the latest information about FAS, log onto www.FAS.org.

Budget

\$ 2,957,070 operating budget.

2008 - 09

Location

Federation of American Scientists
1725 DeSales Street, NW
6th Floor
Washington, DC 20036

TEL 202-546-3300



President's Message

FAS: More than sixty years of trusted analysis on science and security.

The Federation of American Scientists has a tremendous opportunity to work with an administration that has voiced its respect for science. As a well-respected voice of science, FAS strives to solve some of the world's most daunting problems.

For these last two years, FAS experts have spoken on the promise and perils of nuclear technology. The same technologies used to enrich uranium and reprocess spent nuclear fuel to recycle plutonium for energy purposes can also be used to enrich weapons-grade uranium and provide plutonium for nuclear weapons. And as demand for nuclear power grows with rising energy needs, more countries seek to develop nuclear power.

While in Prague in April 2009, President Barack Obama called for a world without nuclear weapons. But he also acknowledged the major hurdles to achieve that world. He cautioned that the United States will maintain nuclear weapons as long as others have them. However, he committed his administration to reduce the saliency of these weapons. FAS is working vigorously to analyze pathways to a nuclear weapon free world while ensuring security for all nations.

In addition to our work on reducing nuclear threats, FAS today has major projects in biosecurity, conventional arms transfers, government secrecy, learning technologies, and energy and environment, focusing on building technology.

The many successes described in this report would not have been possible without the unwavering support of our members and foundation partners alike. In the current economic climate, the year ahead will likely be an even more challenging one. For

everything you have helped us accomplish, we thank you.

With more than sixty years of trusted analysis, the Federation of American Scientists is determined to find better ways to bring the insights of the scientific community into national and international policy discussions. FAS is well placed to provide a link between the scientific community and national policy makers, the public and the press.

The accomplishments discussed in this report were achieved during Dr. Henry Kelly's time as FAS President until July 2009 and Dr. Ivan Oelrich's service as Acting President until December 31, 2009.

While FAS has accomplished much over the last two years, we recognize that we must evolve, grow and seek new opportunities to create a better, safer world. We remain grateful for members and donors who support advances in science and rigorous analysis to make the world a more secure place. As always, your contributions will be vital to these efforts.

Thanks again for your continued support,

Charles D. Ferguson
President

Three FAS Programs

**FAS's work is grouped into three broad programs:
Strategic Security, Learning Technologies, and Energy and the Environment.**



The Strategic Security Program promotes creative approaches to security problems and new global security threats. FAS solutions are international in scope, pragmatic, and fundamentally grounded in sound science.



The Learning Technologies Program focuses on ways to use technology to improve how people teach and learn. Emerging technologies have the potential to make learning more productive for students of all ages and all backgrounds and are an essential part of meeting the nation's education and training challenges.



The Building Technology Program works to advance innovation in building design and construction that can improve quality, affordability, energy efficiency and hazard protection while lowering construction and operating costs. Technical advances, including new composite materials and prefabricated components, both

“The achievements of our staff belie our size.

As a result, all those associated with FAS should be justifiably proud of all that has been accomplished.”

Strategic Security



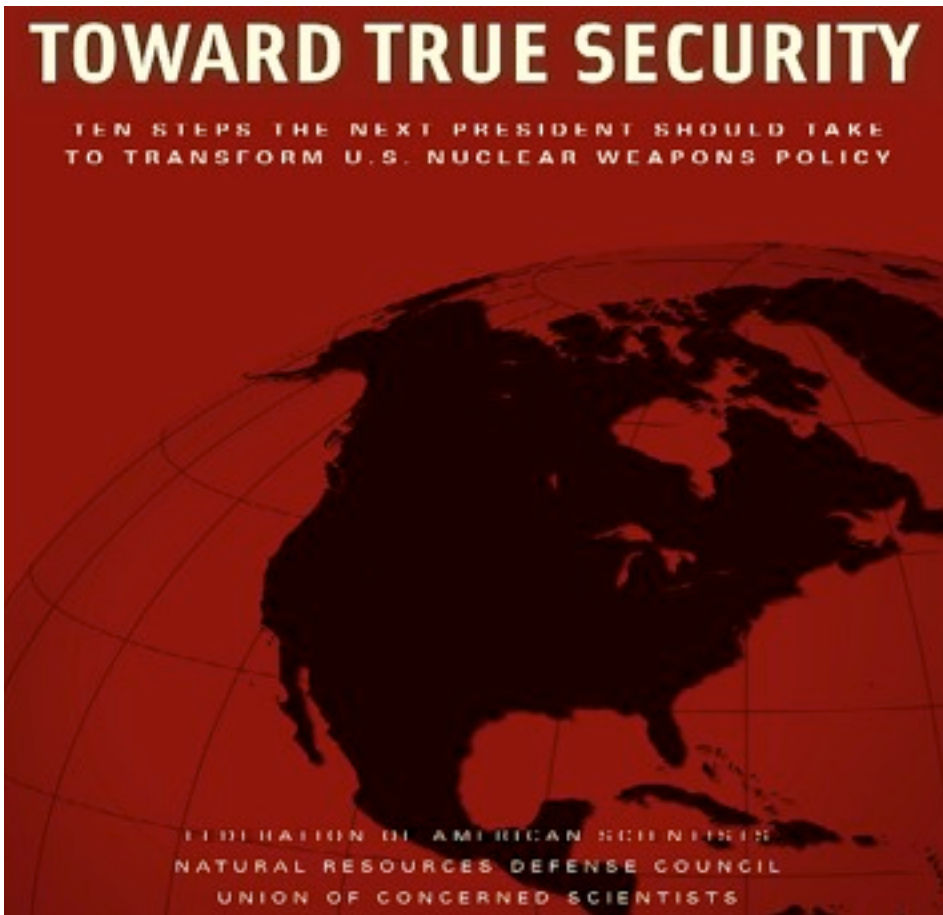
FAS pursues projects that reduce the amounts, spread, and risk of nuclear weapons, secure existing weapons and materials, strengthen international non-proliferation regimes, stop the global illicit trade in conventional weapons, guard against the spread of dangerous technologies, promote the safe and responsible use of new biotechnology, and advocate sensible attitudes toward access to government information. FAS analysts frequently brief policymakers about its work on security and sophisticated technical issues.

To learn more please visit www.FAS.org/programs/ssp/index.html.

Nuclear Non-Proliferation

- Nuclear Policy: Develops U.S. nuclear posture recommendations to meet post-Cold War demands.
- Nuclear Terrorism: Designs policies to prevent access to nuclear materials and technology, detects and locates inappropriate activity, and mitigates the impact of any incidents.

President Barack Obama's decisive victory, based on the theme of change, provides a unique opportunity to make advances in national security and domestic policy. As President Obama clearly understands, the greatest nuclear dangers to the United States are an accidental or unauthorized nuclear attack, the spread of nuclear weapons to more nations, and the acquisition of nuclear materials by terrorists.



Toward True Security

In February 2008, the Federation of American Scientists, with the Natural Resources Defense Council (NRDC) and the Union of Concerned Scientists (UCS), issued *Toward True Security*, a report that called for declaring one sole mission for U.S. nuclear weapons, for taking all nuclear weapons off launch-ready alert, and for reducing the U.S. nuclear arsenal to a total of 1000 warheads.

While the report echoes the prescription of Shultz, Kissinger, Perry, and Nunn outlined in the *Wall Street Journal*, *Toward True Security* goes beyond their recommendations by arguing that the United States should not wait for bilateral or multilateral agreements; it should take unilateral steps to begin the process.

The report outlines 10 specific steps the Obama administration should take to transform U.S. nuclear policy, which would put the world on a path to an eventual ban of nuclear weapons and demonstrate global leadership. To learn more, please visit www.FAS.org/press/news/2008/feb_toward_true_security.html.

The good news is that this understanding is bipartisan. An outstanding example of the bipartisan consensus forming around the urgent need to reduce these nuclear threats is the set of powerful *Wall Street Journal* opinion pieces in recent years by former Secretaries of State George Shultz and Henry Kissinger, former Secretary of Defense William Perry, and former Senate Armed Services Chairman Sam Nunn. These statesmen have compelled the nation to ask questions about its nuclear policy. A new debate is focused on implementing strategies for the worldwide elimination of nuclear weapons.

The ten steps outlined in *Toward True Security* would be an excellent start.

From Counterforce to Minimal Deterrence -- A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons

In 2009, FAS and the NRDC released a report that called for fundamental changes to U.S. nuclear war planning. ***From Counterforce to Minimal Deterrence - A New Nuclear***

Policy on the Path Toward Eliminating Nuclear Weapons pressed for the U.S. to abandon the central mission for U.S. nuclear forces, which is “counterforce,” the capability for

U.S. forces to destroy an enemy’s military forces, its weapons, its command and control facilities, and its key leaders.

The nuclear mission flows from directives and guidance given by the president, through the Secretary of Defense, and the Joint Chiefs of Staff, to Strategic Command where it is implemented into elaborate war plans. The report calls for eliminating all but one mission

for nuclear forces – deterrence of others’ nuclear forces.

To learn more, please visit www.FAS.org/pubs/pages/occ_pap7.html

Highlights from the Nuclear Information Project (NIP)

April 2008: Published satellite image showing Chinese deployment of a new class of nuclear ballistic missile submarine to a new base on Hainan Island for the first time.

July 2008: Published newly declassified government information documenting important changes to U.S. nuclear policy, including cancellation of a controversial preemptive strike plan and changes in guidance for planning against Russia and other potential adversaries.

September 2008: Briefing on the role of U.S. nuclear weapons in counter-proliferation to the University of New Mexico.

October 2008: Briefing on the U.S. nuclear posture to nuclear weapons conference organized by the Norwegian Defence Command and the Norwegian Institute of International Affairs.

January 2009: Briefing on U.S. non-strategic nuclear weapons deploy in Europe and NATO nuclear weapons issues to Middle Powers Initiative Article VI Forum in Berlin.

February 2009: Disclosed that the U.S. nuclear arsenal had been reduced to the limit of the Moscow Treaty three years early.

March 2009: Published an estimate of Russia's non-strategic nuclear weapons.

May 2009: Final report from Congressional Commission on the Strategic Posture of the United States relied on estimates developed jointly by FAS and NRDC for the number of nuclear weapons in the world.

Fall 2009: Chapter entitled "The Role of US Nuclear Weapons in Regional and Counterproliferation Scenarios" published in book by the University of Mexico.

The NIP co-authored the Nuclear Notebook columns in the Bulletin of the Atomic Scientists and the overview of world nuclear forces published by the Stockholm International Peace Research Institute (SIPRI) Yearbook. Both publications are among the most often cited for current numbers of nuclear weapons in the world. The Congressional Research Service frequently references the notebooks in reports and the SIPRI Yearbook is translated into Russian, Chinese and Arabic.

International Atomic Energy Agency (IAEA) Safeguards Analytical Laboratory

In July 2009, as part of FAS's ongoing research on nuclear weapons proliferation and Iran's gas centrifuge program, the Vice President of the Strategic Security Program Ivan Oelrich and Ivanka Barzashka, a research associate, visited the International Atomic Energy Agency (IAEA) Safeguards Analytical Laboratory (SAL) in Seibersdorf, Austria. Oelrich and Barzashka met with Herman Nackaerts, Director of Division of Operations B at the IAEA Department of Safeguards, who confirmed the FAS hypothesis for the discrepancy between Iranian logbook data and the physical inventory verification (PIV) data. Nackaerts explained how containment and surveillance measures are affected by an enrichment plant's throughput and how the IAEA plans to improve the accountancy system at Natanz in Iran. SAL provides analysis of nuclear material and environmental samples from nuclear material fuel cycle facilities around the world.

Summer Symposium on Science and World Affairs in Shanghai, China

In July 2009, Ivanka Barzashka presented FAS research on Iran's centrifuge program at the Summer Symposium on Science and World Affairs in Shanghai, China. Young scientists and engineers from various countries including the United States, Russia, China, Germany, India, Norway, and Pakistan met to discuss issues related to arms control and security.

ARMS SALES MONITORING PROJECT (ASMP) -- SMALL ARMS

The Arms Sales Monitoring Project raised awareness of, and shaped policy on, a range of issues related to the international arms trade and the threat posed by illicit small arms and light weapons.

- Arms Trade: Outlines and advocates arms export policy that strengthens national security and reflects American values.

SMALL ARMS SURVEY 2008: Deadly Deception - Arms Transfer Diversion

Matthew Schroeder, project manager of the Arms Sales Monitoring Project, examined the problem of diversion as related to stockpiles, international transfers, and end-user documentation in a chapter entitled **Deadly Deception - Arms Transfer Diversion** of the Small Arms Survey 2008. This annual yearbook is the most prestigious and widely read publication on small arms control in the world.

Schroeder provided an in-depth assessment of diverted arms exports and the strategies adopted by states to detect and prevent such diversions. Diverted arms shipments—in which arms are redirected to unauthorized end users—can range from small packages of components for civilian firearms to hundred-ton shipments of military-grade light weapons.

The redirection can occur at any moment in the transfer chain and may involve the participation of corrupt government officials. Light weapons pose serious threats to human security. A shoulder-launched surface-to-air missile—known as a man-portable air defense system, or MANPADS—can be used to shoot down a civilian airliner with hundreds of passengers on board.

Highlights from the Arms Sales Monitoring Project

April 2008: Matt Schroeder, Project Manager for the Arms Sales Monitoring Project, briefed Assistant Secretary Mike Vickers of the Defense Department's Office for Special Operations/Low-Intensity Conflict (ASD/SOLIC) on the proliferation of shoulder-fired, surface-to-air missiles.

May 2008: Schroeder traveled to Geneva for meetings on new Defense Trade Cooperation Treaties with Australia and the United Kingdom.

July 2008: Launch of "Missile Watch," a new quarterly electronic newsletter that calls attention to the illicit trade in shoulder-fired, surface-to-air missiles. Subscribers receive updates on the black market trade in shoulder-fired missiles, stockpiling and use of these missiles by non-state groups, and related topics. For more information visit www.FAS.org/programs/ssp/asmp/MANPADS.html.

March 2009: Schroeder spoke on the culture of transparency by the U.S. government concerning its arms transfers at the "International Trends of Production, Trade, Usage and Consumption of Ammunition of Small Arms and Light Weapons" conference in Rio de Janeiro, Brazil. The briefings covered topics ranging from the illicit trade in ammunition to patterns of ammunition consumption by police forces.

July 2009: "Sifting the Sources: Authorized Small Arms Transfers," in Small Arms Survey 2009: Shadows of War (Cambridge University Press, 2009).

Foreign Relations Authorization Act

Legislative language authored and shaped by the Arms Sales Monitoring Project was included in the Foreign Relations Authorization Act, Fiscal Years 2010 and 2011 (H.R. 2410). Additional provisions authored by the ASMP are expected to be included in the Senate version of the authorization bill and in a House bill on foreign assistance that will be introduced.

Small Arms Missing from Iraq

The Spring 2008 issue of the FAS Public Interest Report featured a report of the U.S. failure to balance rapid equipment transfers with stringent accountability procedures in Iraq. At the outbreak of the insurgency, weapons were rapidly transferred to the Iraqi Security Forces (ISF) using ad hoc security assistance programs that had neither clear nor stringent accountability requirements.

As the insurgency took root and expanded, expediency became the primary consideration in the effort to develop the ISF. Due to conditions on the ground at the time, and perhaps because U.S. security assistance programs were not configured for wartime conditions, the train-and-equip program operated outside of traditional security assistance programs.

General David Petraeus—then commander of MNSTC-I—admitted that rapidly equipping the Iraqi forces was considered more important than keeping thorough records of equipment distribution, which would have been legally required by established assistance programs. According to some sources—including U.S. government officials, the Turkish government, and a number of news organizations—equipment paid for and delivered by the U.S. ended up in the hands of insurgent and criminal groups, both within Iraq and outside its borders. Though the damage done in Iraq may not easily be rectified, the lessons learned by using an ad-hoc equipping scheme might inform future U.S. methods.



BIOLOGICAL AND CHEMICAL WEAPONS

- *Biological Weapons Control*: Promotes strategies to strengthen domestic and international efforts that block biological weapons proliferation.

The Biosecurity Project defined biosecurity challenges that face the nation, provided sound information and policy guidance, and advocated for overall preparedness for public health emergencies such as pandemics, disasters, and terrorism events.

The Virtual Biosecurity Center

FAS is developing a biosecurity information hub that will transform the dissemination of information, enhance public education, identify critical gaps in biosecurity, and facilitate cooperation within the biosecurity community. This new cooperative project, the Virtual Biosecurity Center (VBC), is an evolution of FAS' efforts in developing interactive education resources.

The biosecurity community tested a beta version of the Virtual Biosecurity Center in September 2009. Some of the partners in the virtual center include the American Association for the Advancement of Science, the National Academies of Science, the Organisation for Economic Co-operation and Development (OECD), Partnership for Global Security, the University of Bradford, the Harvard-Sussex Program, Princeton University and agencies of the U.S. government such as the Central Intelligence Agency, the FBI, the White House Office of Science and Technology Policy, and the Office of the Director of National Intelligence.

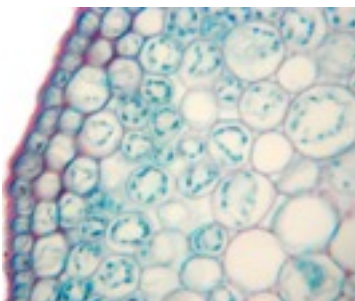
The new virtual center will launch in 2010.

Highlights from the Biosecurity Project

March 2008: Launch of an online compilation of more than 500 documents on the U.S. ratification of the Chemical Weapons Convention (CWC). [The archive](#) includes a timeline of CWC negotiations, a history of its signing and ratification, and current news and commentary on the CWC. Visit the [Chemical Weapons Convention Archive](#) at www.FAS.org/blog/cw/.

April 2008: FAS Biology Research Associate [Cheryl Vos](#) reported and blogged on the proceedings, plenary sessions and open forum during the Second Review Conference of the Chemical Weapons Convention at The Hague, The Netherlands. The CWC is an international treaty, which bans the development, production, use, stockpiling, and transfer of chemical weapons. The treaty text contains provisions for verification of the treaty including explicit inspections procedures, lists of banned chemicals, and deadlines for the destruction of declared weapons stockpiles and production facilities.

July 2008: Launch of the [Office of Technology Assessment \(OTA\) Archive](#). The site allows the public to access more than 720 reports and documents produced by OTA during its 23-year history, including many that have not been available to the public previously. The site also features a new video interview with Congressman Rush Holt (D-NJ). Visit the [Office of Technology Assessment Archive](#) at www.FAS.org/ota/.

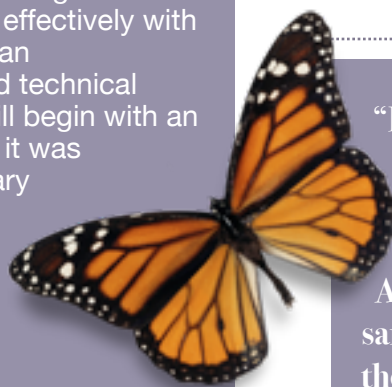


Survey on the Attitudes of Scientists Toward Law Enforcement – FBI to use results to improve relations with the scientific community

In December 2008, a survey conducted by FAS and the Federal Bureau of Investigation (FBI) was released that revealed while scientists are disposed to assist in criminal investigations, they often fear working with law enforcement agencies. Anecdotal evidence suggested that some scientists held negative views of law enforcement and the survey was designed to be the first step in recognizing the scope of the problem and addressing it directly.

The cultural divide between law enforcement and the scientific community presented challenges to strengthening ties. Many in the scientific community were uncomfortable with the idea of interacting with law enforcement personnel, much less cooperating with them. Meanwhile, many in law enforcement did not have a good understanding of how the scientific community works. This divide poses a serious liability to law enforcement, in particular, as cooperation and consultation between the two groups would aid in threat assessment, investigation, intelligence gathering, and the recruitment of future personnel with specialized skills.

The FBI will be developing a training video to help their agents interact more effectively with scientists during the course of an investigation or when they need technical expertise. The training video will begin with an introduction to the survey, why it was conducted, and what the primary findings were.



Case Studies in Dual-Use Biological Research – New FAS Tool Teaches Scientists to Engage the Public

In March 2009, FAS released the Public Reaction to Science Research module in the FAS Case Studies in Dual-Use Biological Research multimedia series. The new online resource examined the public reaction to scientific research. Most scientific research goes largely unnoticed by the general public until media reports reveal major scientific breakthroughs or biosafety accidents. The module was designed to increase scientists' awareness of the perception of their research, the possible consequences, and how scientists can engage the public to address their concerns.

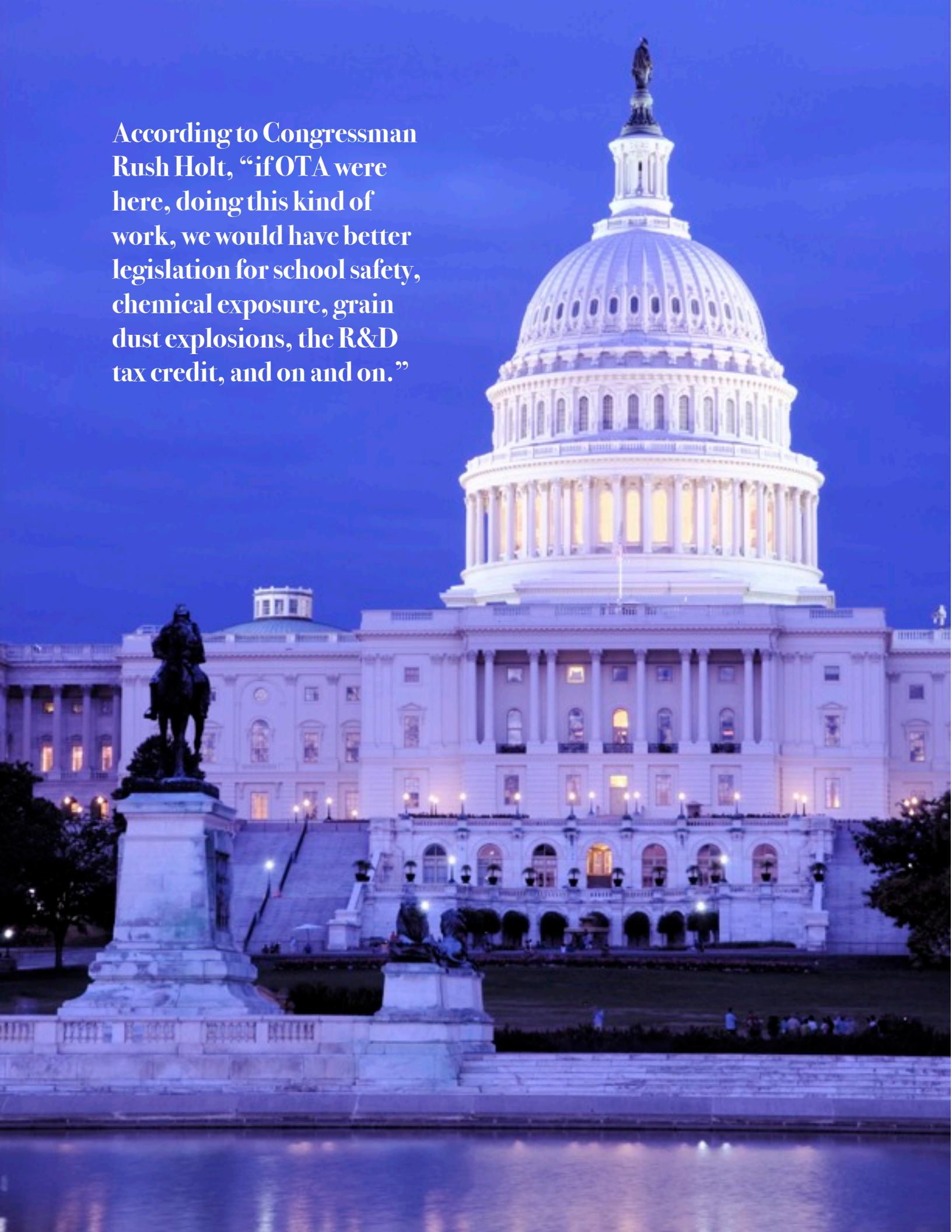
Susan Ehrlich, a former Judge in the Arizona Court of Appeals, was the public representative on the National Science Advisory Board for Biosecurity (NSABB) and featured in the new module. In a series of video clips, she stresses the importance of scientific research and explains why scientists need to engage the public and address their concerns.

The education series illustrates the implications of dual-use biological research through case studies of researchers and provides a historical background on bioterrorism, bioweapons and the current laws, regulations and treaties that apply to biodefense research.

The modules currently are being used in classrooms around the country. FAS collaborated with the FBI to distribute 1000 DVDs at scientific meetings and conferences. The curriculum is provided for free online at www.FAS.org/biosecurity/education/dualuse/index.html.

“I want scientists to be evangelists,” Susan Ehrlich, a former Judge in the Arizona Court of Appeals and the public representative on the National Science Advisory Board for Biosecurity (NSABB), said in one video segment. “My fear is that if there is not a bridge over the chasm between scientists and the public, that the scientific enterprise will be harmed.”

**According to Congressman
Rush Holt, “if OTA were
here, doing this kind of
work, we would have better
legislation for school safety,
chemical exposure, grain
dust explosions, the R&D
tax credit, and on and on.”**



PROJECT ON GOVERNMENT SECRECY

- **Secrecy Policy:** Promotes a careful balance of legitimate secrecy requirements with the information needs of an open democratic society, including in scientific research.

Restrictions on access to information are a perennial problem in national security policy. In recent years, official secrecy has taken on whole new dimensions, encompassing a growing volume of classified information as well as many kinds of so-called “sensitive but unclassified” information. The project seeks to promote public oversight and government accountability in intelligence and national security policy.

The secrecy project also promotes public access to government information and fosters the development of improved information security policies. Hard-to-find government records and public policy reports are published online to a growing audience among the public, the press and the government. Through research, advocacy, and public education, the project has worked successfully to illuminate, to confront, and to overcome some of the more extreme and unnecessary forms of secrecy.

The FAS Project on Government Secrecy provides unique public collections of Intelligence Community Directives, documents from the DNI Open Source Center, and an assortment of military doctrine on special operations. FAS also publishes hundreds of valuable reports of the Congressional Research Service that are not otherwise publicly available. Many of these materials are first made available through the Secrecy News newsletter and blog. Secrecy News is published 2 - 3 times per week and provides original reporting on news and emerging issues in secrecy policy, with links to source documents online. Currently, more than 13,000 people are on the distribution list.

To read Secrecy News, please visit www.FAS.org/blog/secrecy/.

Highlights from the Government Secrecy Project

January 2008: The steady increase in the use of intelligence contractors is an additional challenge to intelligence oversight, a development that existing oversight practices may be ill-suited to meet. An astonishing 70 percent of the intelligence community budget is now spent on contracts with commercial entities.

March 2008: FAS persuaded the Army and Marine Corps to restore public access to online digital documents. The Government Secrecy Project was instrumental in restoring an online library of thousands of U.S. Army documents. After the Army restricted access to the library, FAS initiated a Freedom of Information Act proceeding to obtain a copy of the entire document collection. Confronted with the FAS’s request, the Army relented and removed restrictions on the library collection. Read more at www.FAS.org/blog/secrecy/2008/03/marine_corps_will_restore_online_access_to_public_documents.html

Spring 2009: A paper written by Aftergood entitled “Reducing Government Secrecy: Finding What Works” was published in the Yale Law and Policy Review.

June 2009: Aftergood reported on how the U.S. Government Printing Office posted a 266-page report on its website that detailed the whereabouts of both government and civilian nuclear sites, along with describing the activities carried out there. Read more at www.FAS.org/blog/secrecy/2009/06/nuclear_sites.html.

June 2009: Aftergood spoke on a panel entitled “Does Government Secrecy Still Make Sense In The Internet age?” at the Conference on Computers, Freedom and Privacy in Washington, DC.

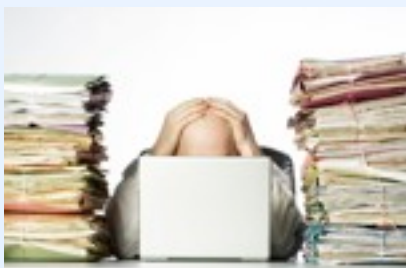
November 2009: Aftergood lectured on Secrecy and Democracy at Scripps College in Claremont, California.



Intelligence oversight lacks the personnel, the full range of expertise, the requisite information, and other resources needed to do the job.

“In toto, we are perhaps one dozen or so full-time budget staff supporting the Intelligence Authorization and Appropriations Committees of both the House and the Senate reviewing activities conducted by tens of thousands of civilian and military personnel and programs valued in the multiple billions of dollars,”

wrote Senate Intelligence Committee staffer Mary K. Sturtevant in 1992 in a revealing internal account of the congressional oversight process at that time.



Testimony on Government-wide Intelligence Community Reforms

In February 2008, Steven Aftergood, Director of the Project on Government Secrecy, testified before the Senate Homeland Security and Governmental Affairs Committee as it considered legislation that would bolster the Government Accountability Office's (GAO) role in intelligence oversight. While the Director of National Intelligence opposed the idea, FAS endorsed the ability of the GAO to audit and evaluate intelligence programs to improve congressional oversight of intelligence.

At a time when the U.S. intelligence community has expanded in size and complexity, Congress should use all of the tools at its disposal to ensure that intelligence activities are conducted in compliance with the law, and are performed efficiently and effectively. In the past decade, intelligence spending has doubled, but intelligence oversight capacity has not grown at the same rate. For this reason alone, it is appropriate to activate new oversight tools.

Congressional oversight of intelligence, which has never been robust, has not kept pace with the extraordinary growth of U.S. intelligence in the past decade, and has not yet adapted to the fundamental changes associated with the growing reliance on intelligence contractors. In FY 1997 the aggregate total of all U.S. intelligence spending was \$26.6 billion. This figure included the budgets for national, joint military and tactical intelligence. In FY 2007 the total budget for the national intelligence program alone was \$43.5 billion. Together with spending for the military intelligence program, which likely exceeds \$10 billion annually, the resulting aggregate figure is more than \$50 billion per year. This is an extraordinary rate of growth. Given the great sensitivity and importance of intelligence activities, the net decrease in intelligence oversight is a problematic development that warrants a response.

Classification Policy

In the summer of 2009, the Project on Government Secrecy developed language for a new executive order on classification policy. The executive order prepared by the Obama Administration included a provision proposed by FAS to perform a “fundamental classification guidance review” at each executive branch agency that classifies information. The purpose of such reviews would be to eliminate obsolete classification requirements. This is one step the new administration could take to overcome the legacy of Bush administration secrecy.

To learn more please visit www.FAS.org/blog/secrecy/2009/09/draft_exec_order.html.

Learning Technologies

A prosperous future U.S. economy will automate most anonymous, routine physical tasks and will rely on new tools that educate, heal, persuade, and communicate with unprecedented connections to a reservoir of worldwide information. The only affordable way to provide a highly diverse population with the education and training required to make them part of a fast-paced, flexible economy will involve using the same information technology tools that have made other service enterprises more productive. This means making use of simulations, personalized tutors, and continuous embedded assessments.

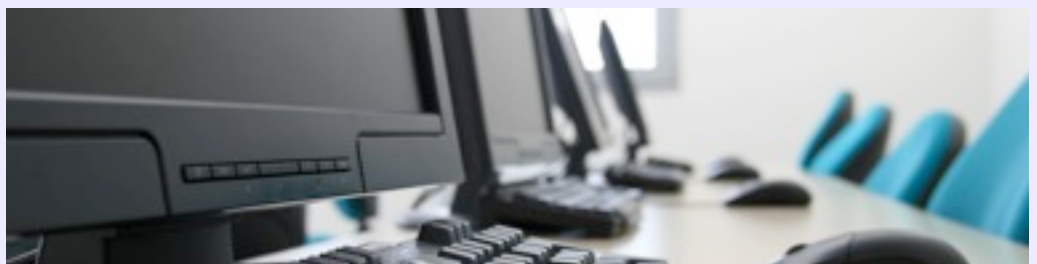
- *Learning Tools:* The development and introduction of tools and techniques that can make learning more engaging, more effective, and more accessible.
- *The Digital Promise:* Created a national center that will help transform education, training and lifelong learning through innovative use of advanced information technologies.

To learn more please visit <http://www.fas.org/programs/ltp/index.html>.

The explosive growth in information, and the complexity of scientific and technology problems require a new approach to how people teach, learn, and conduct research. Most sectors of the U.S. economy have taken advantage of information technology to improve productivity, share information and design organizations that allow them to adjust quickly to change.

In education, costs continue to soar – college tuition outpaces growth in incomes – and the income gap is growing between people with college degrees and those with a high school education.

The Learning Technologies Program focuses on ways to use technology to improve how people teach and learn. Emerging technologies have the potential to make learning more productive for students of all ages and all backgrounds and are an essential part of meeting the nation's education and training challenges.



Congress Forms the First National Research Program Focused on Technology and Learning

In August 2008, Congress authorized a major new research center, the National Center for Research in Advanced Information and Digital Technologies, that will bring the same focused, sustained research funding to technology and learning that the federal government has funded for years in technology for health care at the National Institutes of Health and technology for energy at the Department of Energy.

FAS and the Digital Promise worked for several years to encourage the research authorized in this new legislation. Simulations and software capable of tailoring responses to individual users have found ways to focus users' attention for hours while they acquire the skills and information needed to achieve complex objectives.

The new center will support a comprehensive research and development program to explore ways advanced computer and communication technologies can improve all levels of learning. By bringing together experts in educational theory, teachers, computer scientists, game designers, and subject matter experts, the new center will have the power to drive dramatic improvements in the nation's educational system – improvements that will be celebrated by teachers, parents, and, most importantly, the students themselves.

The U.S. needs a well-educated workforce to face growing competition from China, India, and Europe. Americans need to constantly upgrade their skills to keep pace with technology and international competition, and people who are losing their jobs often need to acquire new skills to rejoin the workforce.

This initiative is built on historical precedents. Once each century, during a time of national crisis, the United States has made a transformative investment in education – the Northwest Ordinance brought public education in the 18th century; the Land Grant Colleges Act brought public higher education in the 19th century; and the GI Bill of the 20th century. Creating the National Center will bring learning and skills training into the 21st century.



The not-for profit center, which will receive both appropriated funds and support from private sources, will “support precompetitive basic and applied research, development, demonstrations, and assessments of prototypes of innovative digital learning and information technologies as well as the components and tools needed to create them.” All material resulting from the research will quickly be made freely and nonexclusively available to the public. Initial funding will be appropriated through the Department of Education.

The National Center is part of the reauthorization of the Higher Education Act, approved by Congress on July 31, 2008, and signed into law by President Bush on August 14, 2008.



“This new National Center will help move schools, universities, and training facilities nationwide into the 21st century,” said Senator Chris Dodd of Connecticut, one of the proposal’s original sponsors. “America’s reputation as an international leader rests in the hands of our youth.”





The Evolution of a Game -- The Story of Immune Attack

In May 2008, FAS released the most current version of Immune Attack, an exciting and fast-moving video game that teaches the scientific facts of immunology. The game was designed to teach how the immune system works to defend the body against invading bacteria. The visual elements and simulations were critical for grasping the complex interactions of the biological systems.



Immune Attack complements the traditional learning that happens in the classroom. The game allows students to use sights, sounds, and touch to get better acquainted with the immune system. It also encourages them to interact with each other and have problem-solving discussions to enhance their game-play and ultimately learn the subject. Preliminary surveys indicate that the students who play Immune Attack show an increase in knowledge when compared with students who did not play the game.

FAS's interest in games emerged from research that showed advanced learning technologies, such as video games and computer simulations, helped to address one

of the nation's most pressing needs -- strengthening education and preparing workers for 21st century jobs.

FAS researched and developed ways to produce complex games and 3D interactive simulations that will one day revolutionize education and how people learn. These learning games help students and workers learn globally competitive skills in demand by employers. Computer games hold special interest to a generation who has grown up with them and show promise as educational tools.

Immune Attack builds on insights from FAS's Learning Science and Technology Research and Development Roadmap, the FAS report "[Harnessing the Power of Video Games for Learning](#)," and the Digital Promise.

To learn more or to download a free version of Immune Attack, please visit www.FAS.org/immuneattack.

Highlights from the Learning Technologies Program (LTP)

March 2008: Bruce Milligan, Learning Technologies Project Manager, demonstrated the Code Orange training simulation at the “ER One Conference: Hospitals on the Frontline” in Washington, D.C. FAS, in partnership with the Washington Hospital Center’s Simulation and Training Environment Lab (SiTEL), repurposed its Mass Casualty Incident Response into Code Orange, a 3D simulation to train hospital staff to deal with a mass casualty incident.

May 2008: FAS presented “Evolving over Time – The Story of Immune Attack 2.0” during the Games for Health conference in Baltimore, MD. Michelle Lucey-Roper, Director of the Learning Technologies Program, explained the challenges of developing an educational game – from securing funds to communication between game developers and immunologists to testing the simulation in schools and the evaluation process.

September 2008: Milligan chaired the health and medicine track for the MODSIM World conference held in Virginia Beach, VA. In addition to advising on the overall program, he selected speakers and presented new information.

November 2008: FAS launched the Virtual Worlds Wiki, a one-stop guide for information on the structure and capabilities of virtual worlds. The ambitious catalogue of virtual environments classified more than 70 virtual worlds and included links to tools, news, and useful online reference materials.



Medulla

Medulla is a public media infrastructure to create and curate digital content. Medulla is an enabling technology that allowed users to access an array of interoperable software tools inside virtual worlds with a single point login. Medulla wove existing tools, technologies and standards into a framework to support the use of digital assets such as art, multimedia, and software for learning, teaching and research inside virtual environments. Though the approach of interoperating multipurpose tools seemed straightforward, it presented functional and technological challenges. FAS worked to address these challenges with the help of technology experts, digital curators, and other academics.

Medulla Projects in Second Life

Archeologists, librarians, and humanists volunteered to evaluate the test version of Medulla by creating virtual content in Second Life. One project was a recreation of the city of Gilgamesh - a simulation that included the cultural and architectural aspects of the ancient Mesopotamian city of Uruk when Gilgamesh was king. Another project led by a librarian in Washington State collaborated with teachers to use the 3D virtual content in FAS’s Uruk city to teach concepts in Mesopotamian Algebra to middle school students.

Discover Babylon in Second Life

FAS imported Discover Babylon – an education game about ancient Mesopotamia – in Second Life to investigate the promise virtual world technologies offer to educational communities and to explore opportunities to bring those communities together. The FAS team worked with a diverse group to understand perceptions and requirements, gather scenarios, and complete a feasibility study.



Energy and the Environment



The Building Technology Program works to advance innovation in building design and construction that can improve quality, affordability, energy efficiency and hazard protection while lowering construction and operating costs. Technical advances, including new composite materials and prefabricated components, both helping to meet these goals in ways that are beneficial for builders and owners.

The housing industry worldwide has a terrible track record in innovation. Buildings worldwide are constructed using unsustainable traditional methods that result in structures that collapse during modest earthquakes, require large amounts of fuel to heat, and have poor interior air quality.

About 70 percent of all U.S. electricity goes to power residential and commercial buildings. FAS looked at ways to provide energy-conserving, low-cost housing through the use of innovative technology.

Working with a team of experts in structural engineering, seismic design, indoor air quality, energy analysis, and construction technology, FAS created a series of performance specifications for building houses in low- and moderate-income nations.

To learn more please visit <http://www.fas.org/programs/energy/index.html> .

BUILDING TECHNOLOGIES

- *Building Technology: Uses high performance materials and advanced design methods to make housing safer, more efficient, and more livable while cutting construction and operating costs.*
-

- Affordable and cost effective for residents, including building cost, maintenance cost, life-cycle cost, and resale value.
- Energy efficient and well insulated, offering higher comfort in extreme temperatures with minimal use of costly external energy sources.
- Durable and safe under seismic activity and natural hazards such as strong winds, fire, pests, and moisture. Well-designed to promote good indoor air quality, providing adequate ventilation and air flow.
- Maximize local economic benefits, by requiring intensive unskilled local labor, realistic capital investments in region, and purchasing locally available materials.
- Rapid implementation as a post-emergency shelter and competitive in quality and cost with winterized tents.

The Building Technologies project has combined the talents of renowned architects and engineers along with leading energy experts to tackle housing issues in the U.S. and abroad. FAS continues to advance its building materials research through academic and industry partnerships.

Learn more by visiting: <http://www.fas.org/programs/energy/btech/index.html>.

Highlights from the Building Technologies Project

March 2008: FAS President Henry Kelly spoke on energy conservation and climate change at the Structural Insulated Panel Association (SIPA) Annual Meeting and Conference. His presentation focused on the realities of climate change, as well as the potential of advanced building products like SIPs as a mitigation strategy. The Structural Insulated Panel Association is a non-profit trade association representing manufacturers, suppliers, fabricators/distributors, and builders committed to providing quality structural insulated panels for the construction industry.

May 2008: Briefing of congressional staffers by FAS and the Environmental and Energy Study Institute (EESI) that examined the successful federal-state partnership that led to the production of high quality relief housing (“Mississippi Cottages”) for those left homeless by Hurricane Katrina. The presentation highlighted the successes of the Mississippi Alternative Housing Pilot Program to demonstrate how to procure safe, energy-efficient, high quality housing for emergency relief.

July 2008: John Millhone, senior advisor to the Building Technologies Project, published a white paper with recommendations for a potential economic stimulus package. The report proposed two energy-efficiency recommendations: expanding the Department of Energy Weatherization Assistance Program, which has delivered significant results in carbon reduction and energy efficiency; and a new program of grants for energy retrofits that would reduce U.S. carbon emissions and provide green jobs in the construction industry.



Surviving the FEMA Aftermath

In 2008, the Center for Disease Control revealed that thousands of people lived in FEMA-provided shelters that exposed them to levels of formaldehyde that were up to 40 times more than maximum permitted levels. While this danger had been known for more than a year, people continued to live in these hazardous conditions. Disaster victims face enough challenges. They shouldn't have to worry that their government is exposing them to additional hazards in the housing it provides. With proper planning and good management, the current Gulf Coast fiasco need never be repeated.

Victims of the 2005 hurricanes, Katrina and Rita, lived in cramped, unsafe housing for more than two years. This debacle was part of FEMA's inability to manage procurements to meet emergency housing needs. FEMA purchased thousands of units using a one-page specification which provided no guidance as to expectations or requirements for indoor air quality, fire safety, safety in high winds, energy efficiency, or other essential public safety measures.

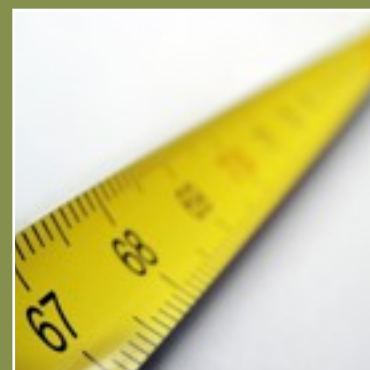
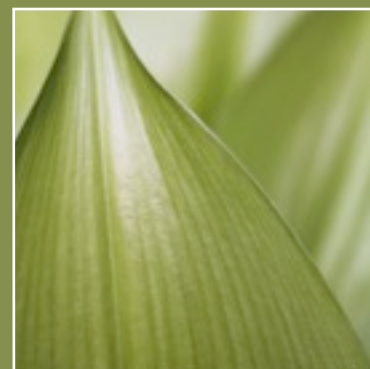
FAS helped FEMA develop a process to ensure that future disaster victims are placed in energy-efficient and safe housing quickly and inexpensively. Provisions for temporary shelters can quickly be converted to permanent homes on permanent foundations, replacing FEMA's disposable travel trailer solution with a lasting contribution to the affordable housing stock post-disaster.

The state of Mississippi replaced 2,000 travel trailers, moving the victims of Hurricane Katrina into safe housing under the Alternative Housing Pilot Program.

Mississippi Alternative Housing Pilot Program

Joe Hagerman, Program Director of the Building Technologies Project, managed the design team of the Mississippi Alternative Housing Pilot Program. He demonstrated how to procure safe, energy efficient, high quality housing for emergency relief.

Hagerman briefed congressional staffers on the successes of the Mississippi Alternative Housing Pilot Program as an example for how to procure safe, energy efficient, high quality housing for emergency relief. FAS experts educated congressional staffers on FEMA's disaster response and will continue working with Congress on possible financial incentives for high performance buildings.



There are good reasons to believe that construction can benefit from the advances that have driven huge increases in quality in other industries – improvements driven by sophisticated understanding of materials, advanced computer controlled design, and management methods that provide quality at all stages of production.



The Energy Independence and Security Act of 2007

FAS and the Environmental and Energy Study Institute (EESI) examined the successful federal-state partnership that led to the production of high quality relief housing (“Mississippi Cottages”) for those left homeless by Hurricane Katrina. Produced by the Mississippi Alternative Housing Pilot Program under a grant to the Mississippi Emergency Management Agency (MEMA), these manufactured housing units are energy efficient (Energy Star compliant), safe (good indoor air quality), and durable (able to withstand 150 mph winds).



The units were designed to meet both manufactured housing standards (the HUD Code, 24 CFR 3280) and building codes for permanent housing (the 2003 International Residential Code). These units were deployed rapidly as relief housing and converted into permanent housing to replenish the area's depleted affordable housing stock.

Professional quality assurance and quality control programs strictly regulated all of the steps—from design to manufacturing, and third-party energy analyses were performed. The project also marks an important step toward meeting the applicable goals of the Energy Independence and Security Act of 2007 (P.L. 110-140) both for manufactured housing and high performance green buildings.



International Code Council

FAS analysts made significant progress toward improving manufactured and emergency housing. The International Code Council (ICC) is considering the creation of High Performance Manufactured Housing Guidelines, which would provide an industry standard to build a safer, more energy efficient home. FAS submitted recommendations for indoor air quality and housing procurement, written with HUD's PATH program office and officials from the Mississippi Alternative Housing Pilot Program.

U.S.-China Green Energy Conference

In November 2008, Hagerman and Research Assistant Brian Doherty traveled to Chengdu, China, to present building material and emergency housing research at the U.S.-China Green Energy Conference in Beijing.

On May 12, 2008, an earthquake devastated the Sichuan region of China. Tremors from the 8.0 M_s magnitude quake were felt as far away as Russia, with surveys showing more than 170,000 square miles affected at a level of "slightly damaging," and over 1200 square miles on the level of "devastating" damage.

With such excessive damage, rebuilding is required on a massive scale. Roughly 5 million people were homeless and 15 million were displaced.

FAS experts spoke on their building materials research, a session entitled

"Rebuilding After the Sichuan Earthquake," and provided recommendations for rebuilding with safe, energy-efficient housing. Hagerman's presentation focused on FAS's work with demonstration homes and seismic research, as well as his recent experience with emergency relief housing.



The U.S. – China Green Energy Conference was formed by a joint coalition of leaders from both countries. Business, technology,

academic, and government leaders from China and the United States met to discuss energy issues of mutual interest, including innovative energy technologies, energy efficiency, and models for U.S. - China business ventures.







FAS Hans Bethe and Public Service Awards

In the years since the founding of FAS, the range and complexity of issues hinging on sound scientific advice have increased. FAS recognizes the efforts of individuals with two awards: the FAS Hans Bethe Award and the Public Service Awards.

FAS Hans Bethe Award

In 2008, FAS honored Dr. Raymond Jeanloz with the award for his demonstration of the reliability of the U.S. nuclear stockpile in the presence of a moratorium on nuclear testing.

Jeanloz's analysis demonstrated the resilience of the U.S. nuclear weapons establishment and provides an opportunity for an extensive examination of post-Cold War nuclear weapons policy and its role in the 21st century.

The FAS Hans Bethe Awards ceremony took place at the Commonwealth Club in San Francisco before a panel discussion on how to develop a practical path to a world free of nuclear weapons. While the future of the world's nuclear security is uncertain, support in the United States continues to grow for major reductions in nuclear weapons. The United States must lead the way to reducing nuclear weapons worldwide.

Jeanloz, professor of geology and geophysics at the University of California at Berkeley, was joined by George Shultz, former Secretary of State and distinguished fellow at Stanford University's Hoover Institution; Joseph Cirincione, President of the Ploughshares Fund; Harold Smith, Professor of the Goldman School of Public Policy at the University of California, Berkeley; Ivan Oelrich, Vice President of the Strategic Security Program at the Federation of American Scientists; and Gloria Duffy, Chief Executive Officer of the Commonwealth Club for the symposium "Paths to Zero – Striving Toward a Nuclear-Free World".

In addition to his primary scientific work on the behavior of matter at high temperatures and pressures and its application to planetary interiors, Jeanloz applied his expertise to vital



questions of national security as the chair of the National Academy of Science's Committee on International Security and Arms Control (CISAC).

Under his leadership, CISAC published several studies and analyses of major security issues such as nuclear weapons policy, the management of weapons-useable material, and on the future of U.S. nuclear forces. George Shultz made clear that he and his colleagues intended to pursue the mission of reducing U.S. and world nuclear arsenals vigorously in 2009.

Hans Bethe Award

Hans A. Bethe co-founded the Federation of Atomic Scientists, now the Federation of American Scientists, with the belief that scientists had an obligation to participate in the difficult choices that were forced on our country by the extraordinary advances in nuclear physics vividly demonstrated by the development and use of atomic weapons.

In 2003, Hans Bethe presented the first award to his friend Philip Morrison for his unfailing ethical compass to America's most critical decisions.



Dr. Hans Bethe with President John F. Kennedy.

Public Service Award

In 1971, the Federation of American Scientists presented the first Public Service Award to Richard Garwin for his courageous and effective testimony on the supersonic transport (SST). Dr. Garwin's unique contribution toward the defeat of the SST program required courage to defy the Nixon administration by testifying before Congress. Since then the Public Service Award has recognized individuals who have served as the conscience of the scientific community.

The award is given to an outstanding scientist, statesman, or public interest advocate who has made a distinctive contribution to public policy.

FAS Public Service Award

In 2008, FAS recognized Dr. Mark D. Levine, director of the China Energy Group at the Lawrence Berkeley National Laboratory, with the Public Service Award for "his extraordinary contributions to energy efficiency research and for his work in China to build a strong energy program." Levine pioneered efforts to collaborate with China on energy technologies.

Several international studies show that China has surged past the U.S. to become the world's largest source of greenhouse gas emissions. According to a recent study by scientists at Lawrence Berkeley National Laboratory, China accounted for 55 percent of the total increase in the world's carbon dioxide emissions between 2000 and 2006.

Together China and the United States produce 40 percent of all global carbon emissions. Each country arrived at this situation from very different histories and face different challenges in meeting climate goals, but both nations understand that solutions hinge on the development of dramatically more efficient methods for using energy and a new generation of clean fuels and sources of electricity.

As part of the awards ceremony, FAS organized a symposium called "What policies should the next U.S. president adopt to help China save energy and reduce greenhouse gas emissions?"

David Fridley of Lawrence Berkeley National Laboratory; Jiang Lin of the Energy Foundation and Senior Vice President and Director of the China Sustainable Energy Program; Tom Gold formerly of the Berkeley China Initiative; Professor He Jiankun of Tsinghua University in China; and Robert Collier, visiting scholar at the Center for Environmental Public Policy joined Mark Levine for the symposium in the Bechtel Engineering Center at the University of California, Berkeley.

Levine is a leader in energy efficiency, playing significant roles in key studies of the American Physical Society, the World Energy Council, the U.S. Department of Energy, the Energy Foundation, and other organizations. He also served on the Intergovernmental Panel on Climate Change (IPCC) team that won the 2007 Nobel Peace Prize, awarded jointly to former Vice President Al Gore, Jr., "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change."

"As long as China appears to do little to reduce growth of greenhouse gas emissions it will be politically difficult for the U.S. to sign an international treaty that commits to a serious cap on emissions. And as long as the U.S. appears to do little, China won't commit to any limits on its own emissions," said Arthur Rosenfeld, commissioner of the California Energy Commission and FAS Board Member.



Financial Summary

FAS is a 501 (c) (3) non-profit, non-partisan organization and contributions may be deducted as provided in section 170 of the Internal Revenue Code. The Federation of American Scientists operating funds come from contributions and grants. Total FAS operating revenues for the fiscal years 2008 – 09 were \$2,432,279.

AUDITED STATEMENT OF FINANCIAL POSITION
AS OF JUNE 30, 2009

ASSETS	
Current Assets	\$ 5,035,443
Fixed Assets (Net)	\$ 163,865
Other Assets	\$ 473,594
TOTAL ASSETS	\$ 5,672,902
LIABILITIES AND NET ASSETS	
Current Liabilities	\$ 356,408
Long-Term Liabilities	\$ 63,485
Total Liabilities	\$ 419,893
Net Assets	
Unrestricted	\$ 1,930,506
Temporarily Restricted	\$ 1,322,503
Permanently Restricted	\$ 2,000,000
Total Net Assets	\$ 5,253,009
TOTAL LIABILITIES AND NET ASSETS	\$ 5,672,902

Total Revenue= \$2,432,279

Expenses = \$2,957,070



- Restricted
- Unrestricted
- Earned Income



- Programs
- Management and General
- Development

**AUDITED STATEMENT OF ACTIVITIES
AS OF JUNE 30, 2009**

REVENUE	
Grants, Contracts, Contributions	
Temporarily Restricted	\$ 1,981,450
Unrestricted	\$ 308,568
Total	\$ 2,290,018
Earned Income	\$ 142,261
Total Revenue	\$ 2,432,279
EXPENSES	
Program Services	\$ 2,259,366
Management and General	\$ 472,885
Development	\$ 224,819
Total Operational Expenses	\$ 2,957,070
Change in Net Assets from Operations	\$ (524,791)
Unrealized Investment Loss	\$ (851,373)
Total Change in Net Assets	\$ (1,376,164)

Why Join FAS?

Your investment in FAS helps make possible dynamic new projects, scientific research, and educational initiatives. You also enable FAS to place more and more resources on its website where everyone can access it. Your contribution is immediately invested to further FAS programmatic activities.

Charity Navigator, the nation's largest and most-utilized evaluator of charities, rated the Federation of American Scientists with three out of four stars. The Independent Charities of America (ICA) certified the Federation of American Scientists with its "Best in America" seal.

FAS is a tax-exempt, tax-deductible, 501(c)3 organization. There are many ways to help support FAS and its programs to secure a safe, healthy and rewarding future for all people.

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Giving online is fast, easy and secure on the FAS website. Gifts of any amount may be made by credit card, and an e-mail confirmation is provided. To make a gift, please call 202.546.3300 or visit http://www.fas.org/member/donate_today.html.

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Thank You For Your Generous Support

The Federation of American Scientists benefits tremendously from the support it receives from its members, and the public and private sectors. These contributions enable FAS to pursue a vast array of projects and activities. In spite of the difficult financial climate, FAS has grown rapidly in the past few years.

For FAS, philanthropic support is essential. FAS is funded by membership dues, individual gifts, private foundations, government grants, and corporate donations.

Annual contributions are essential for maintaining FAS' independence and its ability to enter new areas in a timely way.

During the next few years, FAS will make a major effort to increase membership by engaging younger scientists and engineers. It will also work to attract members from all disciplines and from individuals working in university, government, and corporate organizations.



FAS gratefully acknowledges contributions and grants from:

Carnegie Corporation of New York

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The Entertainment Software Association
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HKH Foundation

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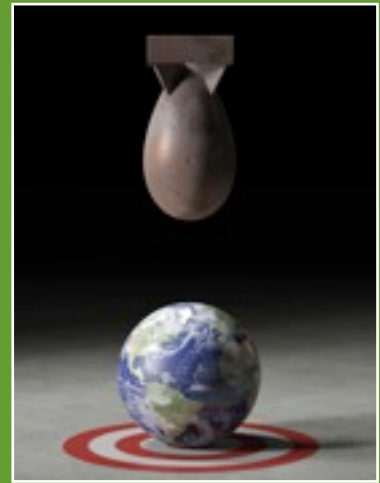
National Institute of Allergy and Infectious
Diseases

Open Society Institute

Ploughshares Fund

Rockefeller Family Fund

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There are good reasons to believe that construction can benefit from the advances that have driven huge increases in quality in other industries – improvements driven by sophisticated understanding of materials, advanced computer controlled design, and management methods that provide quality at all stages of production.

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FAS.org is often the only place to find documents and reports that were once widely available on the Internet. People rely on FAS.org to provide new Congressional Research Service reports and as a means to voice their opinion by commenting on the FAS weblogs and social media websites.

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