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## NASA Reports Criticize Mars Program

After years of streamlining and downsizing as part of the management principle “faster, better, cheaper,” the National Aeronautics and Space Administration (NASA) has declared that its cuts have gone too far. Two reports examining NASA’s Mars program have blamed recent failures of the Mars orbiter and lander on management problems and a lack of funding which are by-products of the faster, better, cheaper philosophy.

“Faster, better, cheaper encourages taking prudent risk where justified by the return,” one of the reports says. Risk associated with innovation and science is appropriate, but risk associated with deviation from sound management principles is not.

As a result, NASA announced that it has cancelled a new Mars lander scheduled for 2001, but will go forward with plans for a new orbiter. The agency also announced that Firouz Naderi, the manager of the Origins Program, which searches for life beyond the solar system, would head up a new Mars Program Office at the Jet Propulsion Laboratory (JPL).

The report issued last month by the Mars Program Independent Assessment Team headed, by Thomas Young a retired Lockheed Martin executive, examined all of the Mars missions undertaken since the advent of faster, better, cheaper. It identifies a probable cause of the most recent Mars Polar Lander failure and makes recommendations for the program’s future. Although it holds that “faster, better, cheaper, properly applied, is an effective concept,” it finds that misunderstandings of this management philosophy resulted in “significant flaws” in the program. The report emphasizes the need for sound project management and adequate financial margins in deep space missions.

The principle of faster, better, cheaper was first incorporated into the Mars program in 1996, when NASA launched two tremendously successful missions: the Mars Global Surveyor, which is still orbiting the red planet and sending back valuable scientific data; and the Pathfinder mission, which featured a small rover and performed important

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## Budget Resolution Passes House and Senate

The House of Representatives (220-208) and the Senate (50-48) approved a final version of the fiscal year (FY) 2001 budget resolution on April 13 just in time to meet the April 15 statutory deadline. In the plan total discretionary spending would rise from \$591.5 billion in FY 2000 to \$605.5 billion in FY 2001, an increase of 2.4 percent. Within the total discretionary portion of the budget, the AAAS analysis reveals that funding for research and development (R&D) is projected to increase from \$83.3 billion in FY 2000 to \$84.9 billion in FY 2001, a modest growth of 1.9 percent. Though the resolution would allow for increases in nondefense R&D in FY 2001, in future years discretionary spending would fail to keep pace with expected inflation.

The budget resolution lays out congressional priorities for the federal budget from FY 2001 to FY 2005, and establishes broad budget aggregates for categories of federal spending. Although there are few specifics in the budget resolution regarding federal support of R&D, the resolution does have a major impact because it establishes the spending

targets under which all federal support for R&D will be considered.

The congressional plan would allow \$42.9 billion for nondefense R&D in FY 2001, an increase of 5.3 percent or \$2.2 billion over FY 2000. This is primarily due to a \$1 billion increase for the National Institutes of Health (NIH), a substantial

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# NRC Study on Genetically Altered Plants

The National Research Council (NRC) released the results of a twelve-month study on transgenic crops stating that genetically engineered plants appeared to be safe but that government oversight could be improved. The report noted that members of the study were not aware of any “evidence suggesting foods on the market today are unsafe to eat as a result of genetic modification.” Dr. Perry Adkisson, chairman of the 12-member NRC study committee noted, however, that “[p]ublic acceptance of these foods ultimately depends on the credibility of the testing and regulatory process, which must be as rigorous as possible and based on the soundest of science.”

The NRC report, *Genetically Modified Pest-Protected Plants: Science and Regulation*, was released at a press conference on April 5. The report notes that though conventional breeding techniques have been in practice for hundreds of years, genetically altered crops have been planted only since 1995. It emphasizes, however, that no clear distinction could be found between the health and environmental risks of conventional plants and transgenic crops. “The breeding process is not the issue; it is the product that should be the focal point of regulation and public scrutiny.”

Even with these supportive statements, the study made several recommendations to improve the research and regulation of genetically engineered plants.

With respect to increasing consumer exposure to allergens the report notes that only one documented case was found. In this case a soybean was modified with a Brazil nut gene, and in a study conducted during the research stage people with a known allergy experienced a negative reaction. The NRC report recommends that a high priority be given for conducting research to improve methods for identifying potential allergens in plants during the research stage and before they are introduced into the commercial market.

The report also acknowledges that potential risk exists that toxicity levels in transgenic plants could increase and pose a health concern. The study group recommends that the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA) create a coordinated database that lists dietary and toxicological information that may pose a risk. A single-site source of data would allow researchers to stay abreast of the latest science.

On the topic of environmental risks, such as exposure to beneficial insects, the report notes that “both conventionally bred and transgenic pest-protected crops could impact these so-called non-target species, [and that] the impact is likely to be smaller than that from chemical pesticides.” The group

recommends that further research in the field is necessary to fully address the concerns raised by studies, such as the one conducted by Cornell on monarch butterflies.

Another environmental risk addressed by the NRC report is the creation of “superweeds” and “superbugs” by passing on genetic traits via natural exposure. In order to better understand the relationship between transgenic crops, and neighboring plants and targeted pests, further research is urged to assess the likelihood and the rate at which genes might spread, as well as techniques to decrease the probability of such change.

Though the NRC committee believes that the regulatory system is working well, some areas were identified for improvement. The group recommended that the EPA, FDA, and the USDA improve the exchange of information between the agencies on genetically modified pest-protected plants. More importantly, the committee recommended that the scope of each agency’s oversight as outlined in the 1986 Coordinated Framework for the Regulation of Biotechnology be clarified. In addition, the report recommends that the agencies conduct research on the ecological impacts of these plants on a long-term basis in order to predict adverse affects.

The NRC study focused strictly on plants that are altered genetically to be pest and disease resistant, and not for other purposes. In addition, the group did not address some of the more controversial themes for example, ethical and social implications, the benefits and disadvantages of labeling, or international trade implications. Even with the cautiously supportive results of the study, proponents and opponents alike of genetically engineered plants had criticisms.

Some industry and agriculture groups opposed the recommendation that the EPA expand its regulation of transgenic crops to include plants altered with genes from a sexually compatible plant or with viral proteins. The EPA currently grants categorical exemptions for these plants, but the study members concluded that these crops could pose potential human health and environmental safety concerns.

Environmental and consumer groups also criticized the report, saying that it was corrupted by a conflict of interest. The critics noted that some of the NRC committee members had received industry research grants and that such ties could cloud their objectivity. About two dozen protestors demonstrated outside of the National Academy of Sciences building prior to the report’s official release. Backed by Rep. Dennis Kucinich (D-OH), the demonstrators demanded that the NRC study be abandoned and a new one conducted with a different panel of experts. ■

scientific tests while returning dramatic photographs. However, in late 1999, the program experienced two major mission failures, with losses of the Mars Climate Orbiter and Mars Polar Lander.

The orbiter, which was designed to settle into orbit around Mars and provide climate data, was lost in September when it went hurtling into the planet's atmosphere. The cause was identified shortly thereafter as an embarrassing failure to convert operating data from English to metric units. The Young report determined that oversight and testing required to reveal potential flaws "were deficient."

The lander, which was designed to examine the planet's surface, was lost in December when the craft failed to reestablish radio contact with mission controllers as expected. The report finds that the "most probable cause" of failure was premature shutdown of the landing engines causing the lander to crash into the surface of Mars at roughly 50 mph rather than the planned landing speed of 5 mph. However, the craft was not equipped to maintain radio contact throughout its descent, so there is no way to determine just how close to the surface it got before something went wrong, and therefore no way of verifying the cause of the failure. The decision to forego capability for radio contact was a gamble that saved money but sacrificed NASA's ability to learn from its errors. The Young report called the decision "a major mistake."

As with the orbiter, testing of the lander was incomplete. Trouble with the landing system was obscured in initial tests by a wiring flaw. After this flaw was fixed, the tests were not repeated. If they had been, the fatal problem would probably have been detected and could have been fixed by a simple change in the system's computer code.

The second report, which was chaired by John Casani of JPL, focused only on the Mars Polar Lander failure. Both the JPL and the Young reports criticized the project's funding, management, and staffing levels. The cost of the lander, which was much lower than earlier planetary missions, was about 30 percent too low, the reports found. The lander was kept on a very tight schedule to accommodate a narrow launch window, exacerbating the funding problems. Since the onset of faster, better, cheaper, JPL has been working on three times as many projects simultaneously as it used to, and the lab's experienced project managers have been stretched to the limit. As a result, the lander and orbiter projects utilized inexperienced managers. The lack of funding led to staffing shortages, the Casani report found, rendering the workforce insufficient for "the levels of checks and balances normally found in JPL projects."

While the Young report criticizes NASA's management failures, it recommends that the Mars pro-

gram continue to operate under the principle of faster, better, cheaper. It suggests that the program be given greater funding, that training and mentoring programs be set up for staff, and that management principles be augmented with clear definitions, policies, and procedures to guide a project's implementation.

In response to these investigative reports, the Senate Commerce Subcommittee on Science, Technology and Space announced that it would step up oversight of NASA. The subcommittee has obtained documents from NASA on the testing of the lander, which it has shared with the House Science Committee. An independent review of these documents is planned. "A thorough review ... is not just in order, but is imperative," said Senate Commerce Committee chairman John McCain (R-AZ). Subcommittee chairman Bill Frist (R-TN) echoed this concern. "It may be time to amend NASA's mantra of 'faster, better, cheaper' to include 'back to the basics,'" he said.

At a hearing before the subcommittee on March 22, NASA Administrator Dan Goldin vigorously defended faster, better, cheaper. Of 146 missions carried out under this principle, Goldin testified, 136 have been successful. He vowed that NASA will not abandon its risk-taking philosophy and compared the agency's current strategy to the more conservative one that preceded it. "I have absolutely no regrets, no concerns, no apologies," he said. "... When you're afraid, you set mediocre goals, everyone's happy, and budgets go up."

Goldin did make clear, however, that he is addressing the agency's recent problems. "NASA is deliberately encouraging a culture change in which any person can speak up," he said. The agency will put a halt to its cost-cutting measures, institute new training and mentoring programs, and form better oversight and review procedures. Accordingly, NASA has requested its first budget increase in seven years and plans to hire 2000 new employees. "We wanted to see where the boundaries [of faster, better, cheaper] were," Goldin said. "... We have now hit the limit."

House Science Committee chairman F. James Sensenbrenner, Jr. (R-WI), who has often been at odds with Goldin, held a hearing addressing the Mars failures featuring testimony from Young and Casani. Sensenbrenner opened the April 12 hearing by stating his belief that effective management is NASA's biggest challenge. "Our role is not to try to micromanage each mission, project, or program," he said. "But, after reading these reports, I am left to wonder: who *was* managing them?" The committee plans to hold another hearing on the topic the second week in May with Goldin testifying. ■





16.6 percent increase for R&D in the National Science Foundation (NSF), and an 11.3 percent boost for nondefense programs in the Department of Energy (DOE). The conference committee failed to pass a Senate amendment that would have increased NIH funding by an additional \$1.6 billion. Most other nondefense R&D funding agencies could receive increases as well. Please refer to the table on the following page.

Defense R&D is not outlined in detail in the budget resolution, however both the President's budget and the budget resolution call for steady increases in defense spending over the next five years. Although both plans call for increases, the Pentagon has set funding priorities for procurement of new weapons systems, operations and maintenance, and military salaries. As a result, defense R&D would likely decline 13.7 percent to FY 2005 after adjusting for inflation.

In future years, the budget resolution projects total federal support for R&D to rise from \$83.3 billion in FY 2000 to \$84.8 billion in FY 2005, but this would actually result in a decline of 7.8 percent after adjusting for expected inflation. Within that amount, nondefense R&D would rise from \$40.8 billion in FY 2000 to \$44.3 billion in FY 2005 if the assumptions in the resolution are followed. Again, this would be a slight 1.6 percent cut after adjusting for expected inflation.

The outyear projections in the congressional plan are less favorable to discretionary spending and hence to R&D, compared to the President's budget. This is because the President's budget would provide far less in tax cuts, leaving room for discretionary spending increases while still preserving substantial surpluses to pay down the national debt. It proposes a large increase in discretionary spending in FY 2001 and smaller increases to keep up with inflation thereafter, thereby allowing many nondefense R&D programs to receive inflation-adjusted increases to FY 2005.

The budget resolution tries to establish a Republican vision for the federal budget in the first election year to take place in a new era of budget surpluses. It sets out a plan to extend the era of surpluses in FY 2001 through FY 2005 while still addressing Republican priorities and establishing clear contrasts with the President's proposed budget for FY 2001.

A major priority in the Republican budget plan is tax cuts similar to the 10-year, \$1 trillion tax cut plan approved by Congress last summer but vetoed by the President. Though the FY 2001 budget resolution looks only at a five-year window, the resolution's \$240 billion tax cut over that period is roughly equal in size to last year's tax proposal. The em-

phasis on tax cuts and not dipping into the Social Security surplus, however, would leave few additional resources for discretionary spending.

Another priority in the budget resolution is defense spending, which would receive substantial increases to reverse a decade of post-Cold War cuts in the military budget. The President also requested an increase for defense, and the congressional plan would provide slightly more. Both plans propose to allow defense spending to rise 2.4 percent after inflation over the next five years. But in order to accommodate tax cuts and to increase defense spending, nondefense discretionary spending would increase only slightly, from \$298 billion in FY 2000 to \$311 billion in FY 2005, a gain of 4.6 percent but a decline of 5.3 percent after adjusting for expected inflation.

This stands in contrast to the President's budget, which because of more modest tax cuts would have room to offer a 2.0 percent increase to FY 2005 after inflation for nondefense discretionary. In FY 2001, the President's budget would provide \$316 billion for nondefense discretionary (up 6.2 percent over FY 2000), nearly \$21 billion more than the budget resolution. Under the congressional plan, nondefense discretionary would actually decline in FY 2001.

The budget resolution provides only broad functional targets for discretionary spending and not program-by-program spending levels. It divides discretionary spending into 20 functional categories and leaves the allocation of those funds to the Appropriations Committees. With approval of a final budget resolution, Congress may now begin the process of drafting appropriation bills for passage. While each individual functional category sets general targets, appropriators must still stay within the overall limit of \$295 billion for nondefense discretionary spending. Therefore, the final spending bills will likely bear only a passing resemblance to the analysis outlined here and presents just one scenario for how the budgets could affect R&D. ■

—Kei Koizumi

*AAAS R&D Budget and Policy Program*

For timely and detailed analysis  
of the R&D budget, visit the  
AAAS R&D Budget and Policy  
Program website at  
[www.aaas.org/spp/R&D](http://www.aaas.org/spp/R&D).

**A Comparison of the Congressional Budget Resolution and the President's Budget for FY 2001  
(Budget Authority)**



	President's Budget			Congressional Budget		Difference
	FY 2000 Estimate	FY 2001 Budget	% Chg. FY 00-01	FY 2001 Proposed	% Chg. FY 00-01	Congress vs. President (\$)
<b>Discretionary Spending (BILLIONS of dollars by budget function):</b>						
<b>Defense</b>	<b>294.1</b>	<b>306.3</b>	<b>4.2%</b>	<b>310.8</b>	<b>5.7%</b>	<b>4.5</b>
<b>Nondefense</b>	<b>297.5</b>	<b>315.9</b>	<b>6.2%</b>	<b>294.7</b>	<b>-0.9%</b>	<b>-21.2</b>
- international	23.9	22.8	-4.9%	20.0	-16.4%	-2.8
- general science	19.2	20.8	8.2%	20.2	5.3%	-0.6
- environment	24.1	24.9	3.7%	24.2	0.6%	-0.7
- transportation	13.3	14.5	9.3%	15.8	18.9%	1.3
- education	53.2	61.5	15.7%	56.8	6.8%	-4.7
- health	33.8	35.0	3.4%	34.8	2.9%	-0.2
- income security	37.8	41.3	9.5%	35.3	-6.5%	-6.0
- veterans	20.9	22.1	5.7%	22.1	5.7%	0.0
- justice	26.7	29.0	8.7%	26.9	0.8%	-2.1
- all other nondefense	44.7	44.0	-1.4%	38.6	-13.6%	-5.4
<b>Total Discretionary</b>	<b>591.5</b>	<b>622.2</b>	<b>5.2%</b>	<b>605.5</b>	<b>2.4%</b>	<b>-16.7</b>
<b>R&amp;D Spending (MILLIONS of dollars by agency):</b>						
Defense (military)	39,282	38,576	-1.8%	38,576	-1.8%	0
Health & Human Services	18,082	19,168	6.0%	19,103	5.6%	-65
<i>Nat'l Institutes of Health</i>	17,102	18,094	5.8%	18,094	5.8%	0
NASA	9,777	10,040	2.7%	9,945	1.7%	-95
Energy	7,117	7,639	7.3%	7,653	7.5%	-14
<i>Defense</i>	3,301	3,405	3.1%	3,405	3.1%	0
<i>Nondefense</i>	3,816	4,234	11.0%	4,248	11.3%	14
Nat'l Science Foundation	2,863	3,431	19.8%	3,338	16.6%	-92
Agriculture	1,763	1,824	3.5%	1,776	0.8%	-48
Commerce	1,073	1,148	7.0%	986	-8.1%	-162
Interior	573	590	2.9%	576	6.0%	-13
Transportation	606	778	28.3%	721	18.9%	-57
Environ. Protection Agcy.	647	673	4.0%	651	0.6%	-22
All Other	1,552	1,561	0.6%	1,587	2.2%	26
<b>Total R&amp;D</b>	<b>83,334</b>	<b>85,427</b>	<b>2.5%</b>	<b>84,912</b>	<b>1.9%</b>	<b>-515</b>
<b>Defense R&amp;D</b>	<b>42,583</b>	<b>41,981</b>	<b>-1.4%</b>	<b>41,981</b>	<b>-1.4%</b>	<b>0</b>
<b>Nondefense R&amp;D</b>	<b>40,751</b>	<b>43,446</b>	<b>6.6%</b>	<b>42,931</b>	<b>5.3%</b>	<b>-515</b>

Source: AAAS analyses of FY 2001 budget request and congressional budget resolution.

Please see March 10 AAAS analysis of the outyear projections for R&D in the FY 2001 budget for full information on the President's budget (<http://www.aaas.org/spp/R&D> in the "FY 2001" section).

April 14, 2000 - based on the final budget resolution figures.

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# Status of Major Legislation

## EDUCATION

### H.R. 4271

Introduced by Rep. Vernon J. Ehlers (R-MI). A bill to establish and expand programs relating to science, mathematics, engineering, and technology education, and for other purposes. 4/13/00 Referred to the Committee on Science, and in addition to the Committee on Education and the Workforce.

### H.R. 4272

Introduced by Rep. Vernon J. Ehlers (R-MI). A bill to amend the Elementary and Secondary Education Act of 1965 to establish and expand programs relating to science, mathematics, engineering, and technology education, and for other purposes. 4/13/00 Referred to the House Committee on Education and the Workforce.

### H.R. 4273

Introduced by Rep. Vernon J. Ehlers (R-MI). A bill to amend the Internal Revenue Code of 1986 to encourage stronger math and science programs at elementary and secondary schools. 4/13/00 Referred to the House Committee on Ways and Means.

## INFORMATION TECHNOLOGY

### NEXT GENERATION INTERNET 2000

#### S. 2046

Introduced by Sen. Bill Frist (R-TN). A bill to reauthorize the Next Generation Internet Act, and for other purposes. 2/9/00 Read twice and referred to the Committee on Commerce, Science, and Transportation. 4/13/00 Committee on Commerce, Science, and Transportation. Ordered to be reported with an amendment in the nature of a substitute favorably.

## BIOTECHNOLOGY

### GENETICALLY ENGINEERED FOOD SAFETY ACT

#### H.R. 3883

Introduced by Rep. Dennis J. Kucinich (D-OH). A bill to amend the Federal Food, Drug, and Cosmetic Act with respect to the safety of genetically engineered foods. 3/9/00 Referred to the House Committee on Commerce. 3/21/00 Referred to the Subcommittee on Health and Environment.

## E-COMMERCE

### ELECTRONIC COMMERCE TECHNOLOGY PROMOTION ACT

#### S. 2046

Introduced by Sen. Bill Frist (R-TN). A bill to facilitate the growth of electronic commerce and enable the electronic commerce market to continue its current growth rate and realize its full potential, to signal strong support of the electronic commerce market by

promoting its use within federal government agencies and small and medium-sized businesses, and for other purposes. 4/13/00 Committee on Commerce, Science, and Transportation. Ordered to be reported without amendment favorably.

## COMMERCE AUTHORIZATION

### TECHNOLOGY ADMINISTRATION AUTHORIZATION ACT FOR FISCAL YEARS 2000, 2001, AND 2002

#### S. 1407

Introduced by Sen. Bill Frist (R-TN). A bill to authorize appropriations for the Technology Administration of the Department of Commerce for fiscal years 2000, 2001, and 2002, and for other purposes. 4/13/00 Committee on Commerce, Science, and Transportation. Ordered to be reported with an amendment in the nature of a substitute favorably.

## BIOMEDICAL RESEARCH

### HUMAN RESEARCH PROTECTION AND PROMOTION ACT OF 2000

#### H.R. 3569

Introduced by Rep. Dennis J. Kucinich (D-OH). A bill to amend the Public Health Service Act to establish an independent office to be known as the Office for Protection of Human Research Subjects, and to assign to such Office responsibility for administering regulations regarding the protection of human subjects in federal research projects. 2/2/00 Referred to the House Committee on Commerce. 2/7/00 Referred to the Subcommittee on Health and Environment.

## IMMIGRATION POLICY

### TECHNOLOGY WORKER TEMPORARY RELIEF ACT

#### H.R. 3814

Introduced by Rep. Lamar Smith (R-TX). A bill to amend the Immigration and Nationality Act with respect to the number of aliens granted nonimmigrant status, and for other purposes. 3/10/00 Referred to House Judiciary Subcommittee on Immigration and Claims and House Science Subcommittee on Basic Research. 3/1/00 Referred to House Education and the Workforce.

### H1-B VISA BILL

#### S. 2045

Introduced by Sen. Orrin G. Hatch (R-UT). A bill to amend the Immigration and Nationality Act with respect to H-1B nonimmigrant aliens. 2/9/00 Read twice and referred to the Committee on the Judiciary. 3/9/00 Committee on the Judiciary. Ordered to be reported with an amendment in the nature of a substitute favorably. 4/11/00 Placed on Senate Legislative Calendar under General Orders. Calendar No. 490.

# Reports and Publications

## CONGRESSIONAL RESEARCH SERVICE

Copies of CRS reports for congressional use are available by calling 202/707-7132.

*Science, Technology, and Medicine: Issues Facing the 106<sup>th</sup> Congress, Second Session* (RL30474). This report presents a brief review and analysis of several important public policy issues that are critically affected by and/or affect developments in science, technology, and medicine.

*Patent Law Reform: An Analysis of the American Inventors Protection Act of 1999 and Its Effect on Small, Entrepreneurial Firms* (RL30451). This report assesses the potential impact of the Act upon small high tech businesses and entrepreneurs. It provides a review of the Act as well as the patent process, and considers the effect that patent reform will have upon small high tech firms.

## GENERAL ACCOUNTING OFFICE

Copies of GAO Publications are available by calling 202/512-6000 or via the Internet at <http://www.gao.gov>.

*Space Shuttle: Human Capital Challenges Require Management Attention* (T-NSIAD-00-133). This report provides a summary of the results of various studies on the impact of workforce reductions, describes NASA's actions following the assessments, and identifies challenges NASA faces in the anticipated heavy workload imposed by the International Space Station. The report also suggests a structured approach that NASA can take to analyze human capital challenges.

*F-22 Aircraft: Development Cost Goal Achievable If Major Problems Are Avoided* (NSIAD-00-68). This report assesses Air Force progress in demonstrating the F-22's expected performance goals. The Air Force's performance estimates are based on limited flight test data, computer models, ground tests, and analyses and will not be confirmed until flight tests are completed. Some tests and scheduled activities were delayed, and the Air Force may not be able to complete flight tests before the program is scheduled to end.

*Nuclear Nonproliferation: Limited Progress in Improving Nuclear Material Security in Russia and the Newly Independent States* (RCED/NSIAD-00-82). This report assesses the progress of the Department of Energy's Material Protection, Control, and Accounting program. It discusses the nuclear material security systems installed and the amount of nuclear material that is protected, the ability of the countries to operate and maintain the systems, the program's costs to date, and the estimated cost of completion.

*Chemical and Biological Defense: Observations on Nonmedical Chemical and Biological R&D Programs* (T-NSIAD-00-130). This testimony discusses coordination of federal nonmedical research and development programs that address chemical and biological

threats. It examines four programs within DOD, DOE and the Technical Support Working Group. It identifies similarities among programs and explains how coordination mechanisms may ineffectively address potential duplication, research gaps, and opportunities for collaboration.

## NATIONAL ACADEMY OF SCIENCES, NATIONAL ACADEMY OF ENGINEERING, INSTITUTE OF MEDICINE, NATIONAL RESEARCH COUNCIL

Government offices may obtain single complimentary copies by calling the Office of Congressional and Government Affairs at 202/334-1513. Others may order copies from the National Academy Press by calling 800/624-6242 or via the Internet at <http://www.nap.edu>.

*America's Health Care Safety Net: Intact But in Trouble* (ISBN: 0-309-06497-X). This report explains how competition and cost issues in today's health care marketplace are posing major challenges to continued access to care for America's poor and uninsured. The book examines the health care safety net from the perspectives of key providers and the populations they serve. It recommends innovative approaches to building public attention, developing better tools for tracking the problem, and designing effective interventions.

*Genetically Modified Pest Protected Plants* (0-309-06930-0). This report analyzes the health and environmental risks of genetically engineered plants, as well as the ability of the U.S. regulatory system to respond to increased entry into the commercial marketplace. The report finds no evidence suggesting foods on the market today are unsafe. It states that no strict distinction exists between the health and environmental risks posed by plants genetically engineered through modern molecular techniques and those modified by conventional breeding practices. The report, however, concludes that regulatory agencies should do a better job of coordinating their work and expanding public access to the process.

*Engineering Challenges to the Long-Term Operation of the International Space Station* (0-309-06938-6). This report assesses the long-term needs to maintain and operate the International Space Station. It notes that though the station is well-designed for long-term operations, steps are needed to ensure that daily maintenance will leave astronauts adequate time to conduct scientific experiments.

*Assessment of Mission Size Trade-offs for Earth and Space Science Missions* (0-309-06976-9). This report assesses the benefits and disadvantages of NASA's move toward "faster, better, cheaper" missions. It states that this move has spawned more efficient management techniques and ways to infuse state-of-the-art technology into its projects. However, it notes that in some cases "faster, better, cheaper" missions have compromised important scientific goals.



## HEARD OFF THE HILL



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**A Long Tail.** On May 1, 1996, NASA's Ulysses spacecraft was taking routine measurements of the solar wind when suddenly its data seemed to go haywire for a couple of hours. In an accidental discovery, astronomers have now identified the source of this data: Comet Hyakutake. The data from Ulysses reveals a tail on Hyakutake three times as long as the distance from the Earth to the Sun, far larger than any cometary tail ever observed. This is a potentially significant discovery because comets are thought to hold clues to the formation of Earth and life. [NASA](#) April 5, 2000.

**Ultrasonic Drills.** The drill is a ubiquitous tool used in a wide variety of everyday applications. An exotic purpose, however, has motivated the development of a new type of ultrasonic drill at NASA: the need for spacecraft to bore into the surfaces of distant planets and asteroids. The new drill, which uses an up-and-down motion, is driven by piezoelectrics—materials that expand or contract when subjected to an electric field. Though it weighs only 1.5 pounds, it can bore into very hard rocks with minimal external force. Its drill bit does not require sharpening and can be guided by hand during operation, and the drill can make holes of different shapes, such as squares or hexagons. [NASA](#) April 12, 2000.

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**Neanderthals.** For a long time, scientists have argued about the fate of the Neanderthals. Some argue that these early bipeds, which died out around 28,000 years ago, interbred with early humans who were the ancestors of today's Europeans. Others, however, contend that the brawny, thick-browed creatures were a completely separate species with no relationship to modern humans. It now appears that this debate is finally coming to an end. A team of scientists compared DNA from a Neanderthal and a modern human and found major differences which suggest that interbreeding did not occur. [The Washington Post](#) April 3, 2000.

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**Shark Cancer.** Shark cartilage has become a popular alternative treatment for cancer thanks to a mid-1990s book entitled *Sharks Don't Get Cancer*, and research showing that a shark cartilage protein can inhibit certain tumor-promoting agents. But now, two scientists are saying that sharks *do* get cancer. In fact, not only can they get cancer, they can even get cartilage cancer. Sharks do have a low cancer incidence, but the scientists have nonetheless identified 40 cases of cancer in sharks, including three instances of cartilage cancer. [Science](#) April 14, 2000.



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